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The purpose of this study was to compare rates of anxiety disorders and symptoms in college students with and without ADHD and to identify factors that protect against anxiety in this population. Forty-six college students with ADHD and a matched control group of 46 students without ADHD participated in this study. Participants completed a diagnostic interview to assess for lifetime and current anxiety disorders; they also completed several measures of anxiety symptoms. As expected, participants with ADHD were more likely to have a lifetime history of an anxiety disorder than participants without ADHD, and were also more likely to report having entered college with a previous history of an anxiety disorder. Participants in the two groups were equally likely to meet diagnostic criteria for a current anxiety disorder. Participants in the ADHD group endorsed significantly lower self-efficacy and significantly higher maladaptive beliefs about worry and obsessive-compulsive symptoms compared with the control group, though the between-group differences in maladaptive beliefs about worry and obsessive-compulsive symptoms were no longer significant when depressive symptoms were covaried. The two groups did not differ on symptoms of panic, social anxiety, or worry, which was unexpected. Perceived social support was associated with a lower risk of having a current anxiety disorder in the ADHD group. The findings of this study highlight the substantial comorbidity that students with ADHD display upon college entry.

ANXIETY IN COLLEGE STUDENTS WITH ADHD

by

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## CHAPTER I

### INTRODUCTION

Attention-Deficit/Hyperactivity Disorder (ADHD) is one of the most common childhood conditions, and for a majority of affected individuals, symptoms and impairment associated with this disorder persist into adolescence and adulthood. Although rates of college entry and college completion among individuals with ADHD are lower than in peers without ADHD (Weiss & Hechtman, 1993), ADHD is the most common disability reported among first-year college students (Pryor, Hurtado, DeAngelo, Blake, & Tran, 2010). Research on college students with ADHD, however, is extremely limited, and well-established findings on children and adults with ADHD may or may not generalize to college students with ADHD. College students with ADHD are thought to differ from the general population of individuals with ADHD in several important ways, and may have higher intellectual abilities, higher academic achievement prior to college, and better adaptive skills than individuals with ADHD who do not attend college (Frazier, Youngstrom, Glutting, & Watkins, 2007; Glutting, Youngstrom, & Watkins, 2005). Still, college students with ADHD have difficulty in a number of domains, including academics, interpersonal relationships, and adjustment to college and symptoms of other disorders (e.g., Heiligenstein, Guenther, Levy, Savino, & Fulwiler, 1999; Rabiner, Anastopoulos, Costello, Hoyle, & Swartzwelder, 2008; Shaw-Zirt, Popali-Lehane, Chaplin, & Bergman, 2005).

Research has consistently demonstrated that children, adolescents, and adults with ADHD are quite likely to meet diagnostic criteria for at least one additional disorder, with up to 60% of clinic-referred children and up to 80% of clinic-referred adults having at least one other psychological disorder (Barkley, 2006). Further, studies of children, adolescents, and adults have overwhelmingly concluded that individuals with ADHD are at increased risk for other disorders compared to individuals in the general population. A widely-cited meta-analysis suggests that children and adolescents with ADHD are approximately ten times more likely to have Oppositional Defiant Disorder (ODD) or Conduct Disorder (CD), five-and-a-half times more likely to have a depressive disorder, and three times more likely to have an anxiety disorder (Angold, Costello, & Erkanli, 1999). While the developmental pathways between ADHD and other externalizing difficulties such as ODD and CD have been studied extensively (Loeber & Burke, 2011), comorbidity and developmental pathways between ADHD and internalizing disorders such as anxiety and disorders are less well-understood.

Existing research on the relation between ADHD and anxiety in college students has been mixed; some studies have found that students with ADHD are at high risk for anxiety disorders and symptoms, while other studies have suggested that students with ADHD have comparable levels of anxiety disorders and/or symptoms to other students (Heiligenstein et al., 1999; Heiligenstein & Keeling, 1995; O'Rourke, Benson, & Sommer, 2012; Richards, Rosén, & Ramirez, 1999). These past studies have notable limitations, including not using well-defined ADHD samples, failing to assess anxiety systematically for all participants as in the case of some chart review studies, and

assessing anxiety only as either a dimensional or categorical construct. Thus, there is a gap in the field's understanding of comorbidity between ADHD and anxiety across the lifespan, as the relation between ADHD and anxiety in college students is not well established.

The term “comorbidity” has been used in many ways in the psychological literature and may refer to the co-occurrence of two or more disorders in individuals or to the covariation of one or more disorders in populations (Angold et al., 1999; Kaplan & Feinstein, 1974; Lilienfeld, 2003; Lilienfeld, Waldman, & Israel, 1994; Piotrowski, 2007). In this paper, the term comorbidity is used to mean “covariation among diagnoses across individuals” (Lilienfeld, 2003, p. 286). One common explanation for comorbidity, and the explanation that is reflected in the current study, is two disorders that co-occur in a population more frequently than would be expected by chance because one disorder causes or contributes to the other (Kaplan & Feinstein, 1974). With regard to ADHD and anxiety, the possibility that anxiety causes or contributes to the development of ADHD seems unlikely, given what is known about the highly genetic etiology of ADHD as well as the fact that the typical age of onset for ADHD typically precedes that of an anxiety disorder. The possibility that ADHD contributes to the development of an anxiety disorder is plausible and is supported by longitudinal research indicating that children with ADHD are at increased risk for anxiety disorders in later development (Biederman, Faraone, Milberger, & Guite, 1996; Bussing, Mason, Bell, Porter, & Garvan, 2010).

The purpose of this study was to further examine the relation between ADHD and anxiety in college students. Given the inconsistency in past findings, the primary aim of

the project was to determine whether college students with ADHD are at a greater risk for anxiety disorders and symptoms compared to other college students. A secondary aim of the project was to examine factors that may be protective against anxiety in college students. This study also addressed the methodological limitations of past studies by utilizing a well-defined ADHD group and matched comparison group, assessing anxiety in all participants, and assessing anxiety dimensionally and categorically.

To provide a background for the current study, overviews of ADHD and anxiety disorders are presented first. A review of the literature on ADHD in college students, including what is known about comorbidity between ADHD and anxiety in college students, is then presented. A conceptual model for understanding comorbidity between ADHD and anxiety in college students is discussed, followed by the specific aims and hypotheses of this study.

## **ADHD**

**Defining ADHD.** ADHD is characterized by developmentally deviant symptoms of inattention, hyperactivity, and/or impulsivity. *DSM-IV-TR* provided the diagnostic criteria for ADHD at the time that data for this study were collected (American Psychiatric Association, 2000). In order to meet *DSM-IV-TR* diagnostic criteria for ADHD, an individual must experience clinically significant impairment in one or more domains such as academic, occupational, or social functioning and must experience symptoms in two or more settings. The individual must display six or more symptoms of inattention and/or six or more symptoms of hyperactivity that have persisted for at least six months and are developmentally deviant. These symptoms of inattention and/or

hyperactivity-impulsivity must cause impairment prior to age of seven. Lastly, the symptoms must not be better accounted for by another disorder. This last criterion is quite important as symptoms of inattention, hyperactivity, and impulsivity are found in numerous other *DSM-IV-TR* diagnoses. Based on whether the individual has prominent symptoms of inattention, hyperactivity-impulsivity, or both, he or she may be diagnosed with one of three subtypes of ADHD: Predominantly Inattentive Type, Predominantly Hyperactive-Impulsive Type, or Combined Type. The diagnosis of Attention-Deficit/Hyperactivity Disorder Not Otherwise Specified may be assigned in instances where individuals meet most but not all criteria for ADHD. Cases in which this diagnosis may be useful include when an individual has sub-threshold symptoms of inattention or hyperactivity-impulsivity or when onset prior to the age of seven cannot be established.

The recent publication of the fifth edition of the *Diagnostic and Statistical Manual of Mental Disorders (DSM-5; American Psychiatric Association, 2013)* included changes to the diagnosis of ADHD. The disorder is still characterized by developmentally deviant levels of inattention and hyperactivity-impulsivity, and the symptom list was virtually unchanged. However, two notable changes broaden the diagnostic criteria for adolescents and adults. First, the number of symptoms required for a diagnosis of ADHD was lowered from six to five. Second, the symptoms must be present by age 12 rather than by age seven. *DSM-5* also describes three clinical presentations, including the Predominantly Inattentive Presentation, Predominantly Hyperactive-Impulsive Presentation, and Combined Presentation, instead of three subtypes. While ADHD was assessed in this study using *DSM-IV-TR* criteria, participants who met *DSM-IV-TR*

diagnostic criteria in this study would also meet the broadened *DSM-5* criteria for ADHD.

Current theories of the etiology of ADHD posit that genetic factors that influence neurodevelopment likely cause ADHD (Bradley & Golden, 2001). Family and twin studies suggest that the heritability of ADHD is 60%-90% (Waldman & Gizer, 2006). Neurotransmitter dysfunction, particularly in the dopamine and norepinephrine systems, is associated with ADHD and implicated in its etiology (Pliszka, McCracken, & Maas, 1996). Non-shared environmental influences are thought to have a moderate effect and account for 10-40% of variance in ADHD symptoms (Waldman & Gizer, 2006). Non-shared environmental factors that have been associated with ADHD include in-utero exposure to nicotine, alcohol, or other drugs, low birth weight, stress during pregnancy, and exposure to lead (Barkley, 2006).

Barkley's theory is currently one of the most prominent and widely cited theories of the nature of the symptoms and impairments seen in ADHD (Barkley, 2006). This theory suggests that behavioral inhibition is the core deficit in ADHD. Behavioral inhibition allows for the development of the executive functions, including nonverbal and verbal working memory, self-regulation, and reconstitution. The executive functions, in turn, impact motor control. Barkley argues that this model applies to all people but that the deficits in behavioral inhibition and executive functioning found in individuals with ADHD lead to deficits in motor control, as observed in the ADHD phenotype.

**ADHD in childhood.** The average onset of ADHD occurs between three and five years of age, and symptoms of hyperactivity are typically most prominent at this young

age (Barkley, 2006). Hyperactivity declines throughout childhood and adolescence, with symptoms of inattention becoming more prominent over time (DuPaul, Anastopoulos, et al., 1998). Approximately three to five percent of children meet diagnostic criteria for ADHD (Costello, Mustillo, Erkanli, Keeler, & Angold, 2003; Shaffer, Fisher, Dulcan, & Davies, 1996). ADHD tends to be more prevalent in boys in childhood, with ratios of 3:1 in non-clinic-referred children (Barkley, 2006). Children and teens with ADHD may have impairments in a number of areas, including academics, peer relations, and adaptive functioning (Baker & McCal, 1995; Barkley, Fischer, Edelbrock, & Smallish, 1990; Breen & Barkley, 1988; Frazier et al., 2007; Kent et al., 2011; McConaughy, Volpe, Antshel, Gordon, & Eiraldi, 2011; Nixon, 2001; Stein, Szumowski, Blondis, & Roizen, 1995).

In children, ODD and CD, mood disorders, and anxiety disorders are commonly comorbid with ADHD. Around 50% of youth with ADHD also have ODD or CD (Pliszka, Carlson, & Swanson, 1999), and children with ADHD are over ten times more likely to have ODD or CD compared to children in the general population (Angold et al., 1999). Around 10-30% of youth with ADHD also have a depressive disorder (Pliszka et al., 1999), and they are estimated to have a risk for a depressive disorder that is five times that of the general population (Angold et al., 1999). Around one-third of children with ADHD meet diagnostic criteria for at least one anxiety disorder (Biederman, Newcorn, & Sprich, 1991; Elia, Ambrosini, & Berrettini, 2008; March et al., 2000), and it is estimated that children with ADHD are three times more likely than other children to meet criteria for an anxiety disorder (Angold et al., 1999). Generalized Anxiety Disorder (GAD) is the

most common anxiety disorder in children with ADHD, with approximately 15-25% of children with ADHD meeting criteria for GAD (Elia et al., 2008; Vance et al., 2002).

Longitudinal studies have also demonstrated that children with ADHD are at greater risk for anxiety symptoms (Bussing et al., 2010) and disorders (Biederman et al., 1996) in adolescence compared to children that do not have ADHD.

**ADHD in adulthood.** Long-term prospective longitudinal research has found that a majority of hyperactive children continue to experience at least some symptoms of hyperactivity into adulthood (Barkley, Fischer, Smallish, & Fletcher, 2002; Rasmussen & Gillberg, 2000; Weiss & Hechtman, 1993). Very few published studies have addressed the prevalence of ADHD in adults, but the studies that exist suggest a prevalence of 4-5% in community samples (Kessler et al., 2005; Murphy & Barkley, 1996b). Estimates of the male-to-female ratio of adults diagnosed with ADHD are around 2:1 (Barkley, Murphy, & Kwasnik, 1996; Biederman et al., 1993; Murphy & Barkley, 1996b). Like youth with ADHD, adults with ADHD or with a past history of ADHD may have impairments in a number of domains including academic attainment, personal adjustment and self-esteem, interpersonal functioning, driving, occupational functioning, and legal problems (Barkley, Fischer, Smallish, & Fletcher, 2004; Murphy & Barkley, 1996a; Weiss & Hechtman, 1993).

Findings from studies of clinic-referred samples of adults with ADHD generally indicate that 77-88% of these adults also meet diagnostic criteria for at least one other disorder (Barkley et al., 1996; Biederman et al., 1993). Studies suggest that 16-31% of adults with ADHD also have Major Depressive Disorder (MDD; Barkley et al., 1996;



Biederman et al., 1993; Murphy, Barkley, & Bush, 2002; Roy-Byrne et al.; Shekim, Asarnow, Hess, & Zaucha, 1990). A history of using marijuana, cocaine, and psychedelic drugs, as well as substance use disorders (SUDs), is also more common among adults with ADHD compared with other adults (Murphy & Barkley, 1996a; Murphy et al., 2002). High rates of anxiety disorders have also been documented in clinical samples of adults with ADHD, and these studies suggest that 24-53% of adults with ADHD have GAD (Barkley et al., 1996; Biederman et al., 1993; Murphy et al., 2002).

### **Anxiety Disorders**

The *DSM-IV-TR* defined nine anxiety disorders: Acute Stress Disorder, Agoraphobia without Panic Disorder, GAD, Obsessive-Compulsive Disorder (OCD), Panic Disorder with or without Agoraphobia, Post-Traumatic Stress Disorder (PTSD), Social Phobia, and Specific Phobia (American Psychiatric Association, 2000). The following discussion of anxiety disorders will focus primarily on GAD and general theories of anxiety development, given that GAD is the most common anxiety disorder found in both children and adults with ADHD (Barkley et al., 1996; Biederman et al., 1993; Elia et al., 2008; Murphy & Barkley, 1996b; Vance et al., 2002). Further, a number of anxiety researchers have suggested that GAD may be the basic anxiety disorder from which other anxiety and mood disorders emerge (Barlow, 2002; Brown, Barlow, & Liebowitz, 1994; Rapee, 1991).

The hallmark feature of GAD is excessive worry. In children, common worries include health, school, disasters, future events, and personal harm (Weems, Silverman, & La Greca, 2000); in adults, worry typically focuses on work or school, family,

interpersonal issues, health/injury/illness, and finances (Becker, Goodwin, Hölting, Hoyer, & Margraf, 2003; Roemer, Molina, & Borkovec, 1997). The *DSM-IV-TR* diagnostic criteria for GAD require excessive anxiety and worry occurring on most days over a period of six months and about a variety of topics (American Psychiatric Association, 2000). The individual must find it difficult to control the worry, and the worry must be accompanied by at least three of the following physical symptoms (one in children): restlessness, fatigue, difficulty concentrating, irritability, muscle tension, or sleep disturbance. The worry must also cause impairment in one or more domains of functioning. *DSM-5* (American Psychiatric Association, 2013) did not contain significant changes to the diagnosis diagnostic criteria for GAD.

GAD most often develops in the late teens or twenties (Rapee, 1991), though some data suggest that there may be a bi-modal distribution of the onset of GAD with peaks between the ages of 5 and 8 as well as between the ages of 16 and 19 (Campbell, Brown, & Grisham, 2003). GAD is more likely than other anxiety disorders to have a gradual, rather than sudden, onset (Anderson, Noyes, & Crowe, 1984; Tracey, Chorpita, Douban, & Barlow, 1997). GAD also tends to have a chronic course, and episodes may persist for several years or longer (Kessler, Keller, & Wittchen, 2001).

In contrast to the research demonstrating that the etiology of ADHD is strongly tied to genetics, several factors have been implicated in the etiology of anxiety disorders in children, including genetics, temperament, parental anxiety, and parenting practices (Bayer, Sanson, & Hemphill, 2006; Beidel & Turner, 2005; Ehringer, Rhee, Young, Corley, & Hewitt, 2006; Flannery-Schroeder, 2004; Heider et al., 2008; Manassis,

Hudson, Webb, & Albano, 2004; Robinson, Kagan, Reznick, & Corley, 1992; Silva, Dorso, Azhar, & Renk, 2007). Numerous theoretical models exist to explain GAD, and most of these models contain similar elements of diathesis and stress. For instance, Beck and Emery (1985) suggest that predisposing factors (such as a hereditary predisposition, physical disease, developmental traumas, etc.) may contribute to a vulnerability to anxiety that is characterized by a sense that one is subject to dangers over which he has insufficient or no control. Precipitating factors (such as physical disease, severe external stressors, chronic external stress, increased demands, or stressful events that undermine one's confidence) then exacerbate or combine with the predisposing factors and vulnerability to anxiety to contribute to the onset of an anxiety disorder such as GAD. Similarly, Barlow (2002) suggests that biological vulnerabilities and generalized psychological vulnerabilities, caused by early experiences with uncontrollable stimuli that contribute to a cognitive schema characterized by low perceived control, combine with stressors to produce generalized anxiety.

### **College Students with ADHD**

In comparison to the research on children and adults with ADHD, research on college students with ADHD is quite limited and is in its infancy (Weyandt & DuPaul, 2008), in part due to the past belief that most children with ADHD outgrew the disorder by adolescence or certainly by adulthood. Research in this area is important, however, in order to link what is known about ADHD in children and in adults and to deepen the field's understanding of ADHD across the lifespan. In addition, college students with ADHD appear to make up a large percentage of the number of college students with

disabilities who are utilizing disability services (Wolf, 2001), highlighting the importance of understanding college students with ADHD so that they can receive appropriate services on college campuses. The experiences of typical college students provide an essential context for understanding the experiences of college students with ADHD. The normative college student experience, as well as existing research on college students with ADHD, will be reviewed in this section.

**The normative college student experience.** The numbers of high school seniors planning to attend college has steadily increased since the 1970s, and in 2004, 53.5% of high school seniors planned to enroll in a four-year college program in the year following high school graduation (Ingels & Dalton, 2008). College students have a great deal of choice and flexibility regarding their college educations (Arnett, 2004); for instance, they are generally able to begin college immediately following graduation from high school or at some later time, change majors multiple times if desired, enroll in courses continuously or take classes on an alternative timeline, enroll as a full-time student or part-time student, take all classes at one institution or at multiple institutions, graduate within four years or take longer than four years.

One commonality across different college experiences is the increased need for self-regulation among college students. Arnett (2004) notes that the parents of many children and adolescents help to manage and oversee daily activities. Most college students, however, are expected to manage the demands of daily life on their own once they enter college, including eating, sleeping, and other self-care tasks; managing social interactions such as who to befriend, which extracurricular and social organizations to

join, and how much time to spend socializing; and academics, such as which classes to take, how much time to spend studying, and whether to obtain supplemental academic services such as tutoring, study groups, or meetings with professors. Arnett notes that most college students adapt to these new freedoms and responsibilities relatively well; for other students, however,

the freedoms of college life prove to be too much for them to handle. With no one around to exercise control on their behalf, their own resources of self-control and self-discipline prove to be inadequate for the challenges of college life. (p. 127)

Given that ADHD is conceptualized as a disorder characterized by deficits in behavioral inhibition and self-regulation (Barkley, 2006), the demands and freedoms of college life may present particular challenges for students with ADHD.

Young adulthood is generally recognized as a developmental period during which mental health concerns from earlier in development may persist and new mental health problems may have their peak onset (Grant & Potenza, 2010). For example, a recent national study found that approximately 12% of college students met criteria for any anxiety disorder in the last year and 11% met criteria for any mood disorder in the past year based on a self-report interview (Blanco et al., 2008). In this study, only 18% of participants who met criteria for any disorder in the past year had received any treatment.

**Assessment and prevalence of ADHD in college students.** Assessing ADHD in college students poses unique challenges, including a general lack of training in ADHD among service providers for college students, child-focused diagnostic criteria for ADHD, and occasional difficulty in obtaining collateral information from parents or other

relatives (Reilley, 2005; Roy-Byrne et al., 1997). The assessment of ADHD in youth is often initiated by a referral from a parent or teacher and is heavily reliant on information provided by parents and teachers about the child's behavior (Anastopoulos & Shelton, 2001), as these informants are considered to be the most reliable reporters of youth's symptoms of inattention and hyperactivity-impulsivity. In contrast, the assessment of ADHD in college students is often initiated by the student him or herself and is heavily reliant on the student's self-report. Some college students may be capable of convincingly feigning symptoms of ADHD (Booksh, Pella, Singh, & Gouvier, 2010), which is concerning given the access to stimulant medications, academic accommodations, and other services conferred to students with ADHD. These challenges suggest that a multi-modal, multi-informant approach to assessing ADHD in college students is particularly important.

Large studies assessing the prevalence of ADHD in college students using behavior rating scales have suggested that between 2-8% of college students may have the disorder (DuPaul et al., 2001; Heiligenstein, Conyers, Berns, & Smith, 1998; McKee, 2008; Weyandt, Linterman, & Rice, 1995). It should be noted that behavior rating scales do not generally establish the age of onset or duration of symptoms, nor do they generally assess impairment, so figures based only on behavior rating scales may overestimate the number of students who meet all diagnostic criteria for the disorder. Consistent with these estimates, however, are the results from a large national survey of college freshmen, 5% of whom reported having a diagnosis of ADHD (Pryor et al., 2010).

**Impairment in college students with ADHD.** In spite of the possibility that college students with ADHD are higher-functioning than the general population of individuals with ADHD (Frazier et al., 2007; Glutting et al., 2005), they also face considerable stressors with regard to adapting to the college environment. As noted previously, there is a potential mismatch between the self-regulatory abilities of individuals with ADHD and the significantly increased demands for self-regulation experienced in the college environment. Further, upon entry to college, students with ADHD may experience a withdrawal of previous treatments or supports, such as parental assistance with organization or time management or provision of mental health services. This confluence of increased demands for self-regulation, as well as the natural withdrawal of previous supports, has been described as the “perfect storm” of circumstances for students with ADHD who are entering college (Anastopoulos & King, 2014). Past research suggests that a poor fit between an individual and his or her environment may lead to impairments in subsequent emotional development and health (Eccles, Lord, & Roeser, 1996), and a number of studies suggest that college students with ADHD experience impairment in academic functioning, social functioning, and adjustment to college.

It is fairly well established that college students with ADHD experience poorer academic functioning than other students. College students with ADHD have lower grade-point averages, are more likely to withdraw from classes, and are more likely to be on academic probation than other students (Advokat, Lane, & Luo, 2011; Heiligenstein et al., 1999; Norwalk, Norvilitis, & MacLean, 2009). They are also more likely to report

concern about their academic performance (Rabiner et al., 2008). College students with self-reported high levels of ADHD symptoms are less organized and methodical, use fewer self-control or self-disciplinary behaviors, and procrastinate more (Turnock, Rosén, & Kaminski, 1998). College students with ADHD also score lower than other college students on the dimensions of motivation, information processing, self-testing, time management, concentration, selecting main ideas, and test strategies (Reaser, Prevatt, Petscher, & Proctor, 2007). Additional stress may be imposed by interacting with professors; for instance, one survey of college professors suggests that around 25% believe that professors should not provide lecture notes or accept alternative assignments from students with ADHD (Vance & Weyandt, 2008), despite the fact that students with ADHD may be entitled to academic accommodations and services under Section 504 of the Rehabilitation Act of 1973 and/or the Americans with Disabilities Act of 1990.

Other research has suggested that college students with ADHD may also struggle with regard to adjustment to college, social functioning, and work performance. For instance, students in a well-defined ADHD group reported poorer adjustment to college in all domains assessed compared with other students (Shaw-Zirt et al., 2005). Other research demonstrated that college students with self-reported current or past ADHD symptoms reported more social concerns than other students (Blase et al., 2009). College students with ADHD also have poorer self-reported social skills (Shaw-Zirt et al., 2005). Other studies, however, have not found evidence that symptoms of ADHD in college students are associated with social impairment (Norwalk et al., 2009; Rabiner et al., 2008). Finally, college students with ADHD have more difficulties at work, including



poorer self-reported work performance and a higher number of firings (Shifrin, Proctor, & Prevatt, 2010).

**Comorbidity.** Research suggests that college students with ADHD, like other individuals with ADHD across the lifespan, may also be at increased risk for other psychological disorders. College students with ADHD symptoms report more depressive symptoms than other students (Rabiner et al., 2008; Richards et al., 1999), and data from the ADHD Clinic at UNCG suggests that 42% of college students diagnosed with ADHD may also meet criteria for a mood disorder (O'Rourke et al., 2012). College students with ADHD also appear to have poorer self-esteem than other college students (Shaw-Zirt et al., 2005). With regard to SUDs, research has been mixed, in part due to the fact that substance use and SUDs among college students are relatively common (Blanco et al., 2008). The most recent research suggests that college students with ADHD may use alcohol at rates similar to other college students but that they may be at increased risk for risky or dangerous patterns of use of alcohol as well as alcohol-related consequences and impairment (Rooney, Chronis-Tuscano, & Yoon, 2011). ADHD also appears to be associated with a greater likelihood of current tobacco use (Rooney et al., 2011).

Few published studies have examined anxiety in college students with ADHD. Two studies have attempted to establish the prevalence of anxiety disorders in students with ADHD. A record review of college students that had been diagnosed with ADHD by a psychiatrist found that only five percent of the sample was currently diagnosed with an anxiety disorder (Heiligenstein & Keeling, 1995). In contrast, the findings of an unpublished chart review of college students that received a *DSM-IV-TR* diagnosis of

ADHD between 2009 and 2011 suggested that 39% currently met diagnostic criteria for at least one anxiety disorder (O'Rourke et al., 2012).

Two studies have compared anxiety symptoms in students with and without ADHD. A chart review study compared college students with ADHD to a comparison group of college students seeking career counseling and found that students in these two groups had comparable scores on the anxiety subscale of the *Inventory of Common Problems* (Heiligenstein et al., 1999). In contrast, a study of college students with and without ADHD found that the students with ADHD reported significantly more symptoms of somatization, obsessive-compulsive symptoms, anxiety, and phobic anxiety on the *Symptom Checklist-90* (Richards et al., 1999). Only one study has examined the impact of class standing on anxiety in students with ADHD, but this study found that underclass students with ADHD, dyslexia, or both disabilities experience significantly more symptoms of anxiety than students with these disabilities who are transitioning to college (Nelson & Gregg, 2012).

These existing studies have a number of notable methodological limitations that make interpreting these varied results difficult. For instance, neither of the chart review studies included a comparison group that would establish whether students with ADHD were at greater risk for anxiety disorders compared to other college students (Heiligenstein & Keeling, 1995; O'Rourke et al., 2012). Further, in the Heiligenstein (1995) study, it is unclear whether all cases in the study were systematically assessed for the possibility of an anxiety disorder, and if so, how the presence or absence of an anxiety disorder was established. In the Heiligenstein (1999) study, participants with “active

psychiatric or medical comorbidity” were not included in the chart review; therefore, individuals with anxiety disorders may have been excluded from the sample. The Heiligenstein (1999) study also assessed anxiety using a single subscale of a larger measure, and did not account for the multi-faceted nature of anxiety. Each of these four studies reported that participants met diagnostic criteria for ADHD, but several of the studies (e.g., Heiligenstein et al., 1999; Heiligenstein & Keeling, 1995; Richards et al., 1999) failed to describe how all of the diagnostic criteria for ADHD were assessed. For example, none of these studies reported how impairment was established or how alternative explanations for the symptoms were ruled out. Lastly, no single study examined both anxiety disorders and symptoms in students with ADHD.

### **A Model for Understanding ADHD and Anxiety in College Students**

A biopsychosocial model may explain the relation between ADHD and anxiety in college students (Figure 1). The model presented here is an extension of Hudson and Rapee’s (2004) model, which suggests that in general, a vulnerability to anxiety is likely developed with contributions from genetics, parental anxiety, environmental support of avoidance, transmission of threat and coping information, and experiences of failure in childhood; stressful events may later precipitate the onset of an anxiety disorder. Past research has suggested that a child with ADHD may be more likely than other children to have an anxious and/or overcontrolling parent (Biederman, Faraone, Keenan, Steingard, & Tsuang, 1991; Kepley & Ostrander, 2007) and to experience failures in childhood, both of which may increase the risk for forming an anxious vulnerability. For college students with ADHD, acute stressors may include the increased self-regulatory demands

of college, withdrawal of previous treatments and supports, the inherent unpredictability and instability of the college experience, and experiences of underachievement or failure with regard to academics, social functioning, or adjustment to college.

The potential role of protective factors is also important for understanding why some college students with ADHD may not develop significant anxiety symptoms or disorders. Factors that are believed to protect against anxiety in childhood, including responsive parenting, intellectual ability, social-cognitive ability, and self-efficacy, may explain why not all children with ADHD develop a vulnerability to anxiety (Masten, Best, & Garmezy, 1991). Additionally, there is some evidence that children with ADHD who are treated with stimulant medication may be less likely to have to repeat a grade, and they were also less likely to develop anxiety as well as other disorders over a ten-year period (Biederman, Monuteaux, Spencer, Wilens, & Faraone, 2009). Potential protective factors in college are speculative, but factors that prevent experiences of underachievement or failure in college, or that ameliorate the effects of these experiences, may prevent the onset of an anxiety disorder. Such protective factors may include academic resources and support, treatment for ADHD and/or other mental health concerns, social support from peers, and continued family support.

### **The Present Study: Research Questions and Hypotheses**

This study was designed to extend and clarify the relation between ADHD and anxiety in college students. In particular, this study attempted to address limitations of previous studies by using a rigorously defined sample of college students with ADHD, utilizing a control comparison group, assessing anxiety systematically in all participants,

and assessing both anxiety disorders and symptoms. Dimensional approaches to the assessment of anxiety, or approaches looking at anxiety symptoms, are thought to be useful in that they are sensitive to the range of severity of behaviors and may be useful for screening early signs of a problem (Dadds, James, Barrett, & Verhulst, 2004). In addition, this study examined participants' lifetime histories of anxiety disorders in order to address whether pre-college differences in anxiety may help to explain differences in anxiety disorders between these groups. Finally, this study examined protective factors for anxiety in college students, as protective factors have received little attention in past research literature on college students with ADHD.

This study was designed to address the following research questions and hypotheses:

1. Are college students with ADHD more likely to have experienced an anxiety disorder at any point in their lifetime than college students without ADHD?
  - Hypothesis 1a: College students with ADHD will be more likely to endorse a lifetime history of an anxiety disorder than college students without ADHD.
  - Hypothesis 1b: Students with ADHD will enter college with higher lifetime rates of anxiety disorders than students without ADHD.
  - Hypothesis 1c: College students with ADHD will be more likely than other college students to develop an anxiety disorder for the first time while in college.

2. Are college students with ADHD more likely to experience current anxiety compared with college students without ADHD?
  - Hypothesis 2a: College students with ADHD will be more likely to meet diagnostic criteria for a current anxiety disorder than college students without ADHD.
  - Hypothesis 2b: College students with ADHD will report more severe current anxiety symptoms than college students without ADHD.
3. What protective factors may lessen the risk for anxiety in college students with ADHD?
  - Hypothesis 3: Use of academic resources and supports in college, treatment for ADHD and/or other mental health conditions, social support from friends, and continued support from family will be associated with a lesser risk for a current anxiety disorder and fewer current anxiety symptoms in college students with ADHD.

## CHAPTER II

### METHODS

#### **Participants**

In order to qualify for the study, potential participants had to be University of North Carolina Greensboro (UNCG) students between the ages of 18 and 30 years old. The minimum age of 18 ensured that participants would be able to consent for the study; the maximum age of 30 was set to ensure generalizability of the results to a typical college population. Participants in either group were permitted to receive pharmacotherapy, counseling, or other types of support services. The initial pool of participants included 46 participants with ADHD and 82 control participants. The pool of 82 control participants was reduced to a pool of 46 participants that comprised a group that matched the ADHD group on several demographic characteristics; the procedure used to select the control participants from the initial pool is described below.

Table 1 contains the demographic characteristics of the participants in the total sample as well as in the ADHD and control groups. Participants in the final total sample ( $N = 92$ ) ranged in age from 18 to 25 ( $M = 20.2$ ,  $SD = 1.8$ ). Sixty-six percent ( $n = 61$ ) of the sample was female. Ethnic composition of the sample was 12% ( $n = 11$ ) Hispanic/Latino and 88% ( $n = 81$ ) non-Hispanic/Latino. Racial composition of the sample was 59% ( $n = 54$ ) Caucasian/White, 16% ( $n = 15$ ) African-American/Black, 4% ( $n = 4$ ) Asian-American, 4% ( $n = 4$ ) multiracial, and 16% ( $n = 15$ ) other or not reported.

The undergraduate population at UNCG is currently 65% female; 6% Hispanic/Latino; and 58% Caucasian/White, 25% African-American/Black, and 4% Asian-American (UNCG Office of Institutional Research, 2014), and the demographics of this sample closely mirror that of the undergraduate population at UNCG. Forty percent ( $n = 37$ ) of the overall sample were freshmen, 25% ( $n = 23$ ) were sophomores, 15% ( $n = 14$ ) were juniors, and 20% ( $n = 18$ ) were seniors.

As shown in Table 2, the overall sample reported a mean grade-point average (GPA) of 2.8 ( $n = 72$ ,  $SD = 0.67$ ). Only 3% ( $n = 3$ ) reported participation in college athletics, and only 9% ( $n = 8$ ) reported membership in a fraternity or sorority. Forty percent ( $n = 37$ ) reported that they live on campus, 30% ( $n = 28$ ) live in an off-campus apartment or rented house within 10 minutes of campus, 9% ( $n = 8$ ) live in an off-campus apartment or rented house more than a 10-minute drive from campus, and 21% ( $n = 19$ ) live at home with their parents.

The ADHD group consisted of UNCG undergraduates diagnosed with ADHD as determined by a previous clinical or research evaluation at the ADHD Clinic at UNCG or by a screening conducted for the purposes of this study. Participants underwent rigorous multi-method, multi-informant assessment procedures and had to meet all *DSM-IV-TR* diagnostic criteria for ADHD as evidenced by:

- endorsement of six or more symptoms of inattention and/or six or more symptoms of hyperactivity-impulsivity on the Semi-Structured ADHD Interview and/or ADHD-RS Self-Report Version;



- evidence of developmental deviance of symptoms, defined as at or above the 93<sup>rd</sup> percentile on a DSM-IV subscale of the CAARS-S:L;
- corroboration by a parent or other informant of clinically significant inattention and/or hyperactivity-impulsivity during childhood and during the previous six months;
- evidence of the presence of symptoms in two or more settings and clinically significant current impairment associated with their symptoms, as assessed on the Semi-Structured ADHD Interview;
- and the elimination of other possible explanations for the disorder, based primarily on the SCID-CV.

Students with any ADHD subtype, including ADHD Not Otherwise Specified, were eligible for participation.

The control group consisted of UNCG undergraduate students enrolled in an introductory psychology course who participated in the study in exchange for required research credits for the course. Psychology majors are comparable to students majoring in other subjects on a number of psychological variables (King, Bailly, & Moe, 2004), and so these control participants are thought to adequately represent the general population of UNCG students. Control participants did not meet *DSM-IV-TR* criteria for ADHD as defined by endorsement of three or fewer current inattentive and three or fewer current hyperactive-impulsive symptoms on the ADHD-RS Self-Report Version. Seven participants in the pool of control participants were excluded from consideration for in the final control sample because they reported that they had previously been diagnosed

with ADHD and had also taken medication for ADHD. Attempts were made to match the control group with the ADHD group on age, gender, ethnicity, race, and socioeconomic status (SES). Of these demographic factors, it was decided that age and gender would be prioritized for matching. Because the pool of potential control participants contained many participants who were 18 years old, potential control participants were rank-ordered by age and the oldest 46 participants were tentatively selected for inclusion in the control group.

Participants in the ADHD group ( $n = 46$ ) ranged in age from 18 to 25 ( $M = 20.5$ ,  $SD = 2.0$ ), and participants in the control group ( $n = 46$ ) ranged in age from 18 to 24 ( $M = 20.0$ ,  $SD = 1.5$ ). Sixty-seven percent ( $n = 31$ ) of the ADHD group and 65% ( $n = 30$ ) of the control group was female. The ethnicity of the ADHD group was 15% ( $n = 7$ ) Hispanic/Latino and 85% ( $n = 39$ ) non-Hispanic/Latino, and the control group was 9% ( $n = 4$ ) Hispanic/Latino and 91% ( $n = 42$ ) non-Hispanic/Latino. The racial composition of both groups was predominantly Caucasian; the ADHD group was 57% ( $n = 26$ ) Caucasian/White, 17% ( $n = 8$ ) African-American/Black, 6% ( $n = 3$ ) multi-racial, 2% ( $n = 1$ ) Asian-American, and 17% ( $n = 8$ ) other or not reported, and the control group was 61% ( $n = 28$ ) Caucasian, 15% ( $n = 8$ ) African-American, 7% ( $n = 3$ ) Asian-American, 2% ( $n = 1$ ) multiracial, and 16% ( $n = 7$ ) other or not reported. In the ADHD group, 30% ( $n = 14$ ) of the group were freshmen, 22% ( $n = 10$ ) were sophomores, 24% ( $n = 11$ ) were juniors, and 24% ( $n = 11$ ) were seniors, while in the control group 50% ( $n = 23$ ) were freshmen, 28% ( $n = 13$ ) were sophomores, 7% ( $n = 3$ ) were juniors, and 15% ( $n = 7$ ) were seniors. Participants in the ADHD group reported a mean GPA of 2.6 ( $n = 41$ ,  $SD =$

0.68), while participants in the control group reported a mean GPA of 3.1 ( $n = 35$ ,  $SD = 0.55$ ); the GPA of the ADHD group was significantly lower than that of the control group,  $t(74) = 3.28$ ,  $p = .002$ .

The matching procedure described above yielded a final control group that was comparable to the ADHD group with regard to both age,  $t[83.9] = -1.27$ ,  $p = \text{n.s.}$ , and gender,  $\chi^2[1, N = 92] = .05$ ,  $p = \text{n.s.}$  The ethnic composition of the two groups was also comparable,  $\chi^2[1, N = 92] = .93$ ,  $p = \text{n.s.}$  Because of the small number of participants whose racial identification was Asian-American, Native American, multiracial, or other/not reported, these classifications were collapsed into a single category for the purposes of comparing the ADHD and control groups. The ADHD and control groups did not differ with regard to race,  $\chi^2[2, N = 92] = .18$ ,  $p = \text{n.s.}$  An estimated SES, based on parent occupational status, was calculated on the basis of participant-reported information about their parents' current occupation (Nam & Boyd, 2004); however, an estimated SES could not be generated for 65% of the participants based on insufficient information provided by participants for one or both parents. Therefore, participants in these two groups were not compared on SES. An additional comparison was conducted to determine whether these two groups differ with regard to class standing. A comparison of the groups on class standing revealed that the two groups did differ significantly,  $\chi^2[3, N = 92] = 8.04$ ,  $p = .04$ . Class standing categories were collapsed into first-year and upper-class (combining sophomores, juniors, and seniors) categories; when compared using these two categories, the groups are comparable on class standing,  $\chi^2[1, N = 92] = 3.66$ ,  $p = \text{n.s.}$

Table 3 contains psychological characteristics of the ADHD and control samples. Consistent with their ADHD diagnostic status, participants in the ADHD group reported high numbers of childhood and current symptoms. Participants in this group endorsed a mean of 7.4 ( $SD = 2.1$ ) childhood symptoms of inattention and 6.5 ( $SD = 2.2$ ) childhood symptoms of hyperactivity-impulsivity on the ADHD-RS. With regard to current symptoms, participants in the ADHD group endorsed, on average, 7.0 ( $SD = 1.9$ ) current symptoms of inattention and 4.7 ( $SD = 2.3$ ) current symptoms of hyperactivity-impulsivity on the ADHD-RS and 7.6 ( $SD = 1.4$ ) current symptoms of inattention and 4.7 ( $SD = 2.4$ ) current symptoms of hyperactivity-impulsivity on the Semi-Structured ADHD Interview. In addition, ADHD participants' mean  $t$ -scores on the CAARS-S:L DSM-IV Inattention ( $M = 85.4$ ,  $SD = 10.5$ ) and CAARS-S:L DSM-IV Hyperactivity-Impulsivity ( $M = 65.1$ ,  $SD = 13.8$ ) subscales were reflective of developmental deviance. With regard to ADHD subtype, 50% ( $n = 23$ ) of participants in the ADHD group had been diagnosed with the Predominantly Inattentive subtype, 44% ( $n = 20$ ) had been diagnosed with the Combined subtype, and 6% ( $n = 3$ ) had been diagnosed with Attention-Deficit/Hyperactivity Disorder, Not Otherwise Specified. No participant had been diagnosed with the Predominantly Hyperactive-Impulsive subtype. Forty-four percent ( $n = 20$ ) of the ADHD group reported that they currently take medication for ADHD.

In contrast, participants in the control group endorsed a mean of only 1.7 ( $SD = 2.2$ ) childhood symptoms of inattention and 2.3 ( $SD = 1.9$ ) childhood symptoms of hyperactivity-impulsivity on the ADHD-RS. They endorsed a mean of 0.61 ( $SD = 0.93$ ) current symptoms of inattention and 1.0 ( $SD = 1.0$ ) current symptoms of hyperactivity-

impulsivity on the ADHD-RS. As predicted given that participants in this group were selected on the basis of low symptoms of inattention and hyperactivity-impulsivity, control participants endorsed significantly fewer childhood symptoms of inattention,  $t[85] = -12.40, p < .001$ , childhood symptoms of hyperactivity-impulsivity,  $t[85] = -9.69, p < .001$ , current symptoms of inattention,  $t[90] = -19.98, p < .001$ , and current symptoms of hyperactivity-impulsivity,  $t[90] = -9.68, p < .001$ , on the ADHD-RS than participants in the ADHD group.

Thirty-three percent ( $n = 15$ ) of participants in the ADHD group reported that they have a current diagnosis of an anxiety disorder, while 9% ( $n = 4$ ) of the control group reported that they have a current diagnosis of an anxiety disorder.

## Measures

**Diagnostic measures.** The following measures were used in establishing diagnoses of ADHD and anxiety disorders.

***ADHD Rating Scale – IV (ADHD-RS):*** Symptoms of inattention and hyperactivity-impulsivity were assessed for participants in both groups using the ADHD-RS Self-Report Version, a version of the ADHD-RS-IV (DuPaul, Anastopoulos, et al., 1998) modified for use with adults. The ADHD-RS contains 18 items corresponding to the nine inattention and nine hyperactive-impulsive symptoms from *DSM-IV* presented in alternating order. Each item is rated from 0 (symptom is never or rarely present) to 3 (symptom is present very often) for occurrence in childhood and during the past six months. The ADHD-RS Self-Report Version yields symptom counts and severity scores for inattention and hyperactivity-impulsivity as well as a total severity score. In this

study, the ADHD-RS Self-Report Version symptom counts were used to establish that participants in the ADHD group had six or more symptoms of inattention and/or hyperactivity-impulsivity in childhood and currently; for participants in the control group, current symptom counts were used to establish that the participant did not meet diagnostic criteria for ADHD. The ADHD-RS Other Report Version, which also yield symptoms counts and severity scores for inattention and hyperactivity-impulsivity, was given to the parents, siblings, or other informants of participants in the ADHD group in order to corroborate self-report of symptoms of inattention and hyperactivity-impulsivity. Internal consistencies for the inattention and hyperactivity-impulsivity subscales and total scale are high ( $\alpha = 0.88-0.94$ ) (DuPaul, Power, McGoe, Ikeda, & Anastopoulos, 1998). Test-retest reliability over four weeks is good ( $r = 0.78-0.86$ ), and the measure discriminates significantly between youth with and without ADHD (DuPaul, Power, et al., 1998).

***Conners' Adult ADHD Rating Scale – Self-Report: Long Version (CAARS-S:L):*** Developmental deviance of current symptoms of inattention and hyperactivity-impulsivity was assessed in the ADHD group using the self-report long version of the CAARS (Conners, Erhardt, & Sparrow, 2004). The 63 items on the CAARS-S:L are rated on a four-point scale that ranges from 0 (not at all, never) to 3 (very much, very frequently). The CAARS-S:L has age- and gender-based norms. It yields eight subscales, and in this study, the DSM-IV Inattentive Symptoms, DSM-IV Hyperactive-Impulsive Symptoms, and DSM-IV Total ADHD Symptoms subscales were used to establish the developmental deviance of symptoms of inattention and hyperactivity-impulsivity in the

ADHD group. Internal consistency for the CAARS subscales is good ( $\alpha = .86-.92$ ), as is the test-retest reliability ( $r = .89$ ) (Erhardt, Epstein, Conners, Parker, & Sitarenios, 1999). CAARS scores also correlate significantly with another established self-report rating scale of ADHD symptoms, the Wender Utah Rating Scale (Erhardt et al., 1999; Ward, Wender, & Reimherr, 1993).

***Semi-Structured ADHD Interview:*** The Semi-Structured ADHD Interview was administered to participants in the ADHD group. This interview includes questions drawn from the ADHD module of the Computerized Diagnostic Interview Schedule for Children, Version IV (C-DISC-IV; Shaffer, Fisher, Lucas, Dulcan, & Schwab-Stone, 2000). The C-DISC-IV has well-established validity (Schwab-Stone et al., 1996) and reliability for the diagnosis of ADHD in children (Shaffer et al., 2000). The questions drawn from the C-DISC-IV assess a number of diagnostic criteria for ADHD, including symptom count, symptom onset and duration, and impairment associated with these symptoms. The interview also assesses academic history, family history, social history, and psychiatric history. In this study, the Semi-Structured ADHD Interview was administered to participants in the ADHD group as an additional measure of symptom count as well as to establish the age of onset of the symptoms, the settings in which the symptoms occur, and related impairment.

***Structured Clinical Interview for DSM-IV Axis I Disorders, Clinician Version (SCID-CV):*** The clinician-administered SCID (First, Spitzer, Gibbon, & Williams, 1996) is a structured interview that assesses Axis I disorders based on *DSM-IV* criteria. The SCID-CV is considered a gold standard measure of Axis I diagnoses and has been shown

to improve the accuracy of diagnoses in clinical settings over diagnoses made without the use of a structured interview (Basco et al., 2000). Portions of the SCID-CV, including modules that assess mood disorders, psychotic disorders, anxiety disorders, and substance use disorders, were administered to participants in the ADHD group as part of their diagnostic evaluations in order to rule out the possibility that another disorder better accounted for their symptoms of inattention and hyperactivity-impulsivity.

**Dependent measures.** The following measures were administered to assess anxiety in all participants.

*Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-CV):* The Panic Disorder, Agoraphobia, Social Phobia, Specific Phobia, OCD, PTSD, and GAD portions of the Anxiety and Other Disorders module of the SCID-CV were administered to all participants in the study to assess for the presence of anxiety disorders (First et al., 1996). The SCID-CV Anxiety and Other Disorders module assesses for current and lifetime anxiety diagnoses for all disorders with the exception of GAD, in which the SCID-CV assesses only current presence or absence of the disorder. The questions for the GAD section were modified in order to assess for lifetime history of GAD; these modified questions were based on the lifetime history questions for the other anxiety disorders. The SCID-CV Anxiety and Other Disorders module also assess the age of onset for disorders for which diagnostic criteria are met. When it was unclear whether the onset of an anxiety disorder occurred before or after the participant began college (e.g., when the participant indicated that the onset of the disorder was age 17 or after), additional questions were asked in order to clarify whether the onset had been before or



during college. The SCID-CV has fair to good inter-rater reliability for current anxiety diagnoses (Lobbestael, Leurgans, & Arntz, 2011).

***Beck Anxiety Inventory (BAI):*** The BAI (Beck, Epstein, Brown, & Steer, 1988) is a narrow-band measure of anxiety designed for use with adults. Each of the 21 items is rated on a four-point scale ranging from 0 (not at all) to 3 (severely), and the items are summed for a total score ranging from 0 to 63. Higher scores are indicative of greater anxiety symptoms. The BAI total score was used in the analyses for this study. It has been shown to have good internal consistency ( $\alpha = .92$ ) and test-retest reliability over a one-week period of .75 (Beck, Epstein, et al., 1988). The BAI discriminates anxious diagnostic groups from non-anxious diagnostic groups and is only moderately correlated with measures of depression (Beck, Epstein, et al., 1988). BAI scores have also been shown to correlate with physiological measures of anxiety (Borden, Peterson, & Jackson, 1991). Some have suggested that the BAI primarily measures symptoms of panic, and not of anxiety more generally (Cox, Cohen, Dorenfeld, & Swinson, 1996; Leyfer, Ruberg, & Woodruff-Borden, 2006)

***Liebowitz Social Anxiety Scale – Self Report (LSAS-SR):*** The Liebowitz Social Anxiety Scale (Liebowitz, 1987) was originally developed as a clinician-administered measure; the self-report version, developed later, was administered in this study (Baker, Heinrichs, Kim, & Hofmann, 2002). The LSAS-SR consists of 24 items that depict various social situations; 11 items relate to social interaction, and 13 items relate to performance situations. For each item, participants rate their levels of fear and avoidance on a four-point scale. The anchors for the fear ratings range from 0 (no fear) to 3 (severe

fear). The anchors for the avoidance ratings also range from 0 to 3 and reflect the percent of time that the situation is avoided (0 = never, 1 = occasionally [1-33%], 2 = often [33-67%], 3 = usually [67-100%]). The measure yields a total score and six additional scores including total fear, fear of social interaction, fear of performance situations, total avoidance, avoidance of social interaction, and avoidance of performance situations, and higher scores are indicative of higher fear and avoidance. The total score was used in the analyses for this study. For the self-report version, internal consistency for the total score for participants with and without social anxiety is high ( $\alpha = 0.94-0.95$ ), 12-week test-retest reliability is good ( $r = 0.83$ ), and scores correlate highly with scores on the clinician-administered version (Baker et al., 2002; Fresco et al., 2001). Discriminant validity is also good (Baker et al., 2002; Fresco et al., 2001).

***Meta-Cognitive Questionnaire – 30 (MCQ-30):*** The Meta-Cognitive Questionnaire – 30 (Wells & Cartwright-Hatton, 2004) is a short form of the original 65-item Meta-Cognitive Questionnaire (Cartwright-Hatton & Wells, 1997). It assesses positive and negative beliefs about worry, which have been implicated in the maintenance of anxiety disorders, particularly GAD (Wells, 2004). The MCQ-30 contains 30 items that are rated on a four-point scale (“do not agree,” “agree slightly,” “agree moderately,” “agree very much”). The measure yields a total score and five subscale scores, including Positive Beliefs about Worry, Negative Beliefs about Thoughts Concerning Uncontrollability, Cognitive Confidence, Negative Beliefs Concerning the Consequences of not Controlling Thoughts, and Cognitive Self-Consciousness. Higher scores are indicative of stronger endorsement of these maladaptive beliefs about worry.

The total score was used for the analyses in this study. The MCQ-30 has good internal consistency ( $\alpha = 0.93$ ) and correlates highly with measures of state anxiety and worry (Wells & Cartwright-Hatton, 2004). It has adequate five-week test-retest reliability ( $r = 0.75$ ) (Wells & Cartwright-Hatton, 2004).

***Obsessive-Compulsive Inventory – Revised (OCI-R):*** The OCI-R (Foa et al., 2002) is a self-report measure of obsessive-compulsive symptoms and is a shortened form of the original Obsessive-Compulsive Inventory (OCI; Foa, Kozak, Salkovskis, Coles, & Amir, 1998). It contains sixteen items that are rated on a five-point scale (not at all, a little, moderately, a lot, extremely) to indicate the degree to which that symptom has bothered the respondent in the past month. The scale yields a total score as well as six subscale scores: washing, checking, ordering, obsessing, hoarding, neutralizing. Higher scores are indicative of more bothersome obsessive-compulsive symptoms and a cut-score of 21 has been suggested as indicative of clinical symptoms of OCD (Foa et al., 2002). The total score was used in the analyses for this study. As with the OCI, the OCI-R has high internal consistency ( $\alpha = .90$ ) and correlates highly with other measures of OCD (Foa et al., 1998).

***Penn State Worry Questionnaire (PSWQ):*** The PSWQ (Meyer, Miller, Metzger, & Borkovec, 1990) is a 16-item self-report rating scale that assesses worry. Each item is rated on a scale from 1 (“not at all typical of me”) to 5 (“very typical of me”). Six items are reverse-scored, and the items are summed to yield a total score. Total scores can range from 16 to 80, and higher scores reflect greater worry. Total scores were used for the analyses in this study. This measure was developed and validated on samples of

college students (Meyer et al., 1990). It has high internal consistency ( $\alpha = 0.92-0.95$ ) and test-retest reliability over periods ranging from two to ten weeks of 0.74-0.92 (Meyer et al., 1990). The PSWQ distinguishes between individuals with GAD and other anxiety disorders, and correlations between the PSWQ and other measures of anxiety, depression, and emotional control support its convergent and discriminant validity (Brown, Antony, & Barlow, 1992).

***Self-Efficacy Scale (SES):*** The SES is a 30-item measure that assesses individuals' expectations of personal mastery and success (Sherer et al., 1982). It yields a total score and two subscale scores for general self-efficacy (17 items) and social self-efficacy (six items). It also contains seven filler items. The total score was used for the analyses in this study. Items are rated on a five-point scale (disagree strongly, disagree moderately, neither agree nor disagree, agree moderately, agree strongly). Higher scores are indicative of higher self-efficacy expectations. The SES has good internal consistency ( $\alpha = 0.86$  for the general subscale and  $\alpha = 0.71$  for the social subscale) (Sherer et al., 1982). The measure correlates highly with measures of success in educational, vocational, and military areas and with measures of personal effectiveness and global positive mental health (Sherer et al., 1982).

**Other Measures.** The following additional measures were given to all participants.

***Alcohol Use Disorders Identification Test (AUDIT):*** The AUDIT is a ten-item measure that screens for excessive drinking (Babor, Higgins-Biddle, Saunders, & Monteiro, 2001). This scale has also been found to be appropriate for use with college

students (Fleming, Barry, & MacDonald, 1991). Eight of the ten items are rated on a five-point scale, with the remaining two questions being rated on a yes/no scale. The measure yields a total score, with higher scores indicative of greater drinking problems. The total score was used for the analyses in this study. In clinical settings, scores of 8 or greater are considered indicative of problematic alcohol use and possible alcohol dependence.

***Beck Depression Inventory (BDI):*** The BDI is a narrow-band measure of depression designed for use with adults (Beck, Steer, & Garbin, 1988). Each of the 21 items is rated on a four-point scale ranging from 0 (not at all) to 3 (severely), and the items are summed for a total score ranging from 0 to 63. A higher score represents more severe symptoms of depression. The total score was used for the analyses in this study. The BDI has been shown to have good reliability and validity, and it is only moderately correlated with measures of anxiety (Beck, Steer, et al., 1988).

***College Life Questionnaire (CLQ):*** The CLQ was developed in order to assess factors that were hypothesized to be associated with positive outcomes (Appendix A). These factors include past and current treatment of ADHD and other psychological conditions, utilization of campus resources, and social and family social support. In this sample, the Cronbach's alpha was .59, though this measure assesses several factors that were not expected to correlate highly. A total score for this measure was derived by summing the following: number of campus academic resources used "often" or "very often" (up to 10); number of mental health services used "often" or "very often" (up to 3); whether the student had participated in a psychological evaluation in college (one point was added to the total score for a response of "yes"); participants' perceptions of

receiving emotional or instrumental support from friends (one point for indicating that they “often” or “very often” received emotional support when needed and one point for indicating that they “often” or “very often” received instrumental support when needed); number of friends (recoded into 0 = zero friends, 1 = one-two friends, 2 = three-five friends, 3 = six-eight friends, 4 = nine or more friends); satisfaction with social life (0 = “not at all,” 1 = “somewhat satisfied,” 2 = “very satisfied”); perceptions of receiving emotional or instrumental support from family (one point for indicating that they “often” or “very often” received emotional support when needed and one point for indicating that they “often” or “very often” received instrumental support when needed); and satisfaction with family relationships (0 = “not at all,” 1 = “somewhat satisfied,” 2 = “very satisfied”).

***Impairment Rating Scales (IRS):*** Impairment Rating Scales for adults with ADHD collect self-report information about childhood and current impairment related to various life domains (Barkley & Murphy, 2006). Both scales require individuals to rate how frequently their symptoms cause(d) impairment in various domains. The Current Symptoms Scale assesses current impairment in the areas of family, work, social interactions, community, education, romantic relationships, money management, driving, leisure, and daily responsibilities. The Childhood Symptoms Scale assesses impairment that individuals may have experienced in childhood, including in the domains of family, social interactions, community, school, sports, self-care, play, and chores. Ratings of the items are provided on a 0 (“never or rarely”) to 3 (“very often”) scale. Each scale yields a total impairment score (the sum of the answers given across all items) and a

pervasiveness score (the number of different domains rated as a 2 or 3). Higher scores are associated with more severe and/or pervasive impairment. The total impairment scores were used for the analyses in this study.

***Infrequency Scale:*** The Infrequency Scale (Chapman & Chapman, 1983) is a 13-item measure that detects careless and random response styles. Items are self-descriptive and are rated as true/false. Each item was designed to have a very low probability of being endorsed in a certain direction. For example, if a participant responds “true” to the item “I have never combed my hair before going out in the morning,” he or she may be responding in a random or careless manner. The Infrequency Scale was included in this study to screen for random or careless response styles, and participants were excluded if they endorsed three or more items in the unexpected direction.

***Participant Information Form:*** This form was created for the purpose of gathering information regarding gender, age, year in college, race/ethnicity, other demographic variables, and previous or current diagnoses of ADHD and other disorders (Appendix B).

## **Procedure**

**Procedures common to both groups.** Prior to beginning data collection, this study was approved by the UNCG Institutional Review Board (IRB). A Waiver of Authorization for Release of Protected Health Information was also obtained from the IRB in order to allow the researcher to contact clients of the ADHD Clinic who were eligible for the project. All participants provided written informed consent prior to their

participation in the study (Appendix C). Data for this study were collected between September 2012 and June 2013.

Table 4 summarizes the measures completed by participants in each group. After eligibility was established, remaining measures were completed during a single session at the ADHD Clinic. The SCID-CV was administered by one of two doctoral students in clinical psychology who had received formal training in the administration of this measure. Paper-and-pencil measures were then completed in the following order: Participant Information Form, dependent measures and other measures (with the exception of the CLQ) presented in randomized order, CLQ. A random list generator was used to determine the random order of the outcome and other measures for each participant (Haahr, 1998).

Participants in both groups completed the BDI, which contains one item regarding suicidality. Before each participant left, the researcher reviewed the completed BDI to determine whether the participant was experiencing suicidality. A procedure for assessing risk for suicide and consulting with a licensed psychologist was established for cases in which the participant endorsed a 2 (“I would like to kill myself”) or 3 (“I would kill myself if I had the chance”) on item 9 of the BDI; however, no participant in either the ADHD group or the pool of control participants endorsed a 2 or 3 on this item. A list of mental health referrals was provided to participants in either group who reported other significant distress or who inquired about mental health services.

**ADHD group.** Participants in the ADHD group were recruited primarily from the ADHD Clinic at UNCG. Prospective participants were informed about this study



following feedback sessions for clinical evaluations or following their participation in another research study. In addition, clients of the ADHD Clinic who had completed a clinical evaluation in the six months prior to the start of this study, who received a diagnosis of ADHD, and who had agreed to be contacted about research were contacted and invited to participate. Prospective participants received up to two additional follow-up communications about the study. No participant endorsed more than three items in the unexpected direction on the Infrequency Scale, and therefore no participants in the ADHD group were excluded from inclusion in analyses.

Participants who had already completed a clinical evaluation or who had participated in another research project at the ADHD Clinic had already undergone comprehensive evaluations of ADHD, as described previously, and completed shortened batteries for this study. Participants who previously completed a clinical evaluation provided written permission for the researcher to access information from these past evaluations in order to avoid having to complete measures for the study that they had already completed as part of their clinical evaluation (Appendix D). If more than one month had elapsed since the time that participants had completed the SCID-CV or BAI as part of a clinical or research evaluation, they completed these measures again for the purposes of this study. Participants who previously participated in another research project at the ADHD Clinic were generally able to provide copies of completed measures related to their ADHD diagnostic status from the other research project and did not complete those measures again. In signing the consent form, participants also provided permission for the researcher to obtain data from another dissertation project that was

ongoing in the ADHD Clinic and therefore did not need to complete overlapping measures more than one time for these two studies. Participants who were recruited through the ADHD Clinic typically spent 15-60 minutes completing measures, and they received a \$15 gift card as compensation for their time.

Two participants in the ADHD group learned about the study through word-of-mouth from other participants. In order to verify ADHD status for these participants, the ADHD-RS Self-Report Version and CAARS-S:L were administered. If the participant reported six or more symptoms of inattention and/or six or more symptoms of hyperactivity-impulsivity, as well as a T-score of 65 or greater on the corresponding CAARS-S:L subscale, the researcher then administered the Semi-Structured ADHD Interview and any SCID-CV modules that were needed to rule out another disorder as a better explanation of the symptoms. Both of these participants met criteria for ADHD and were included in the ADHD group. Participants in the ADHD group who were recruited by word-of-mouth spent two to three hours completing measures and received a \$25 gift card as compensation for their time.

**Control group.** Participants for the control group were recruited primarily from introductory psychology classes at UNCG; these participants had elected to fulfill a research requirement for their class by participating in several research studies. Some of the students in the introductory psychology class completed an online mass screening procedure in which they completed screening questionnaires for this study and several other studies being conducted in the Psychology Department. Prospective control participants were eligible for the project if they completed the mass screening procedure,

endorsed three or fewer current symptoms of inattention and three or fewer current symptoms of hyperactivity-impulsivity on the ADHD-RS Self-Report Version during mass screening, and answered three or fewer items in the unexpected direction on the Infrequency Scale during mass screening. The researcher contacted these prospective participants regarding their eligibility for the study via e-mail. Each prospective participant was contacted about the study up to three times. Prospective participants then signed up to participate in the study through Experimetrix, an online scheduling system. Relevant measures completed during mass screening were the ADHD-RS, BDI, and Infrequency Scale; these data from mass screening were used if the prospective participant later participated in the study, and the measure was not repeated. Control participants generally spent 30-60 minutes completing the remaining study procedures at the ADHD Clinic.

One control participant learned about this study through a flyer that was posted in the ADHD Clinic (Appendix E). This participant was screened for ADHD symptoms by completing the ADHD-RS Self-Report Version and then completed the remained of the study measures. This participant received a \$15 gift card as compensation.

## CHAPTER III

### RESULTS

#### **Preliminary Inspection of Dependent Variables**

All analyses were conducted using IBM SPSS Statistics Version 21.0. An inspection of the Q-Q plots and skewness and kurtosis statistics for the dependent variables and potential covariates (AUDIT, BAI, BDI, LSAS-SR, MCQ-30, OCI-R, PSWQ, and SES) suggested that the AUDIT, BAI, BDI, and OCI-R were not normally distributed. These variables were log transformed, resulting in normally distributed variables. The final skewness statistics for these variables ranged from -0.574 to 0.861 and the final kurtosis statistics for these variables ranged from -1.011 to 0.382. Next, the data were screened for multivariate normality and outliers by calculating the Mahalanobis distance for each case with regard to the dependent variables and covariates. The Mahalanobis distance was not significant at the  $p < .001$  level for any case. Thus, all data fulfilled expectations of normality for the planned MANOVA and ANOVA analyses. Descriptive statistics for these dependent variables and covariates are listed in Table 5.

Correlations among these dependent variables were examined (Table 6). There were numerous significant correlations among the BAI, BDI, LSAS-SR, MCQ-30, PSWQ, OCI-R, and SES scores. For example, the BAI was significantly correlated with the BDI, LSAS-SR, MCQ-30, PSWQ, and OCI-R; these correlations ranged between .49 and .68 and all were significant at the  $p < .001$  level. There were not any significant

correlations between the AUDIT variable, which had been considered as a possible covariate for subsequent analyses, and any other variables. Thus, the AUDIT was not utilized in subsequent analyses.

### **Primary Analyses**

**Hypothesis 1a: College students with ADHD will be more likely to endorse a lifetime history of an anxiety disorder than college students without ADHD.** The number of participants in each group who endorsed a *lifetime* history of a SCID-CV anxiety disorder was compared. Forty-one percent ( $n = 19$ ) of participants in the ADHD group and 17% ( $n = 8$ ) of participants in the control group endorsed a lifetime history of any SCID-CV anxiety disorder (Table 7). In the ADHD group, GAD was the most common lifetime diagnosis (22%,  $n = 10$ ), followed by PTSD (15%,  $n = 7$ ) and Social Phobia (9%,  $n = 4$ ). In the control group, Social Phobia was the most common lifetime diagnosis (11%,  $n = 5$ ), followed by GAD (9%,  $n = 4$ ) and OCD (6%,  $n = 3$ ). As hypothesized, participants in the ADHD group were significantly more likely to report a lifetime history of any anxiety disorder than participants in the control group,  $\chi^2(1, N = 92) = 6.34, p = .01$ , Cramér's  $V = .26$ . The relative risk was 2.38,  $p = .02$ , 95% CI [1.17, 4.81] for the ADHD group compared to the control group.

**Hypothesis 1b: Students with ADHD will enter college with higher lifetime rates of anxiety disorders than students without ADHD.** Thirty-nine percent ( $n = 18$ ) of participants in the ADHD group reported having met diagnostic criteria for at least one SCID-CV anxiety diagnosis prior to entering college, compared to 17% ( $n = 8$ ) of control participants. As hypothesized, participants in the ADHD group were significantly more

likely to report that they had met diagnostic criteria for an anxiety disorder prior to entering college than participants in the control group,  $\chi^2(1, N = 92) = 5.36, p = .02$ , Cramér's  $V = .24$ . The relative risk for participants in the ADHD group compared to participants in the control group was 2.25,  $p = .02$ , 95% CI [1.10, 4.60].

**Hypothesis 1c: College students with ADHD will be more likely than other college students to develop an anxiety disorder for the first time while in college.**

Only two percent ( $n = 1$ ) of participants in the ADHD group and four percent ( $n = 2$ ) of participants in the control group reported the onset of a new SCID-CV anxiety diagnosis while in college. Due to the small numbers of participants endorsing the onset of a new anxiety disorder in college, the planned chi-square analysis could not be conducted. This finding was unexpected.

**Hypothesis 2a: College students with ADHD will be more likely to meet diagnostic criteria for a current anxiety disorder than college students without ADHD.** The number of participants in each group endorsing criteria for a *current* SCID-CV anxiety disorder was compared. Twenty-six percent ( $n = 12$ ) of participants in the ADHD group and 17% ( $n = 8$ ) of participants in the control group endorsed current criteria for any SCID-CV anxiety disorder (Table 7). In the ADHD group, GAD was the most common current diagnosis (15%,  $n = 7$ ), followed by Social Phobia (9%,  $n = 4$ ) and PTSD (6%,  $n = 3$ ). In the control group, GAD and Social Phobia were the most common diagnoses (9%,  $n = 4$ ), followed by OCD (6%,  $n = 3$ ). Participants in the two groups were equally likely to endorse criteria for any current anxiety disorder,  $\chi^2(1, N = 92) = 1.02, p = \text{n.s.}$ , Cramér's  $V = .11$ , which was unexpected.

**Hypothesis 2b: College students with ADHD will report more severe current anxiety symptoms than college students without ADHD.** A one-way multivariate analysis of variance (MANOVA) was conducted to determine whether there were group differences on the six dimensional dependent measures (BAI, LSAS-SR, MCQ-30, PSWQ, OCI-R, and SES). First, the assumption of equality of population covariances among the dependent variables was met, Box's  $M = 34.20$ ,  $F(21, 27971.79) = 1.51$ ,  $p = \text{n.s.}$ , deeming MANOVA an appropriate statistical technique. As expected, the MANOVA indicated significant differences between the ADHD group and the control group on the dependent measures, Wilks's  $\Lambda = 0.68$ ,  $F(6, 85) = 6.64$ ,  $p < .001$ , partial  $\eta^2 = 0.32$ . Analyses of variance (ANOVAs) were conducted on the six dependent variables as follow-up tests to the MANOVA (Rencher, 2002; Table 8). Follow-up ANOVAs were significant for the MCQ-30,  $F(1, 90) = 6.55$ ,  $p = .01$ , OCI-R,  $F(1, 90) = 4.61$ ,  $p = .03$ , and SES,  $F(1, 90) = 25.43$ ,  $p < .001$ . The ANOVA assumption of equality of variances was violated in the case of the MCQ-30, and the Welch statistic, which does not assume equality of population variances, was also calculated. This test was also significant,  $t(1, 83.587) = 6.55$ ,  $p = .01$ . An examination of the means of each variable (Table 6) revealed that positive and negative beliefs about worry and obsessive-compulsive symptoms, as measured by the MCQ-30 and OCI-R, respectively, were significantly higher in the ADHD group than in the control group. The partial  $\eta^2$  values were 0.07 and 0.05 for MCQ-30 and OCI-R, respectively. Self-efficacy, as measured by SES score, was significantly lower in the ADHD group than in the control group; the partial  $\eta^2$  was 0.22. These differences in beliefs about worry, obsessive-compulsive symptoms, and self-

efficacy were consistent with the hypothesis and the differences were in the expected direction. The ADHD and control groups did not differ significantly on physical symptoms of anxiety, social anxiety, or worry, as measured by the BAI, LSAS, and PSWQ, respectively. This latter finding was unexpected.

Because of the numerous significant correlations between depression, as measured by BDI score, and these dependent variables, a planned MANCOVA examining group differences on these outcome variables was performed. First, the assumption of equality of population covariances among the dependent variables was met, Box's  $M = 34.20$ ,  $F(21, 27971.79) = 1.51$ ,  $p = \text{n.s.}$  This MANCOVA was also significant, Wilks's  $\Lambda = 0.72$ ,  $F(6, 84) = 5.49$ ,  $p < .001$ , partial  $\eta^2 = 0.28$ , suggesting that the group differences in the dependent variables are not fully accounted for by the relation between the anxiety variables and depression. Follow-up ANCOVAs indicated that group differences in self-efficacy, as measured by SES, were significant even when accounting for symptoms of depression,  $F(1, 89) = 19.66$ ,  $p < .001$ , partial  $\eta^2 = 0.18$ . The other follow-up ANCOVA analyses, including those for MCQ-30 and OCI-R, were not significant; this finding suggests that the observed group differences on the MCQ-30 and OCI-R could be accounted for by these variables' relationships with depression.

**Hypothesis 3: Use of academic resources and supports in college, treatment for ADHD and/or other mental health conditions, social support from friends, and continued support from family will be associated with a lesser risk for a current anxiety disorder and fewer current anxiety symptoms in college students with ADHD.** The CLQ total scores for all participants ranged between 4 and 19 ( $M = 10.8$ ,  $SD$



= 3.13) and were normally distributed. The mean CLQ score for the ADHD group was significantly higher than the mean score for the control group,  $M_{\text{ADHD}} = 11.6$ ,  $M_{\text{control}} = 10.1$ ,  $t(87) = -2.32$ ,  $p = .02$ . Scores representing total use of academic resources, total utilization of mental health resources, perceived peer support, and perceived family support were also derived. The ADHD and control groups were compared in each of these four areas. Utilization of mental health resources was significantly higher in the ADHD group,  $M_{\text{ADHD}} = 1.30$ ,  $M_{\text{control}} = 0.24$ ,  $t(90) = -5.79$ ,  $p < .001$ . The groups did not vary on number of academic resources utilized,  $M_{\text{ADHD}} = 1.47$ ,  $M_{\text{control}} = 1.13$ ,  $t(90) = -1.13$ ,  $p = \text{n.s.}$ , perceived peer support,  $M_{\text{ADHD}} = 4.68$ ,  $M_{\text{control}} = 4.64$ ,  $t(88) = -.53$ ,  $p = \text{n.s.}$ , or perceived family support,  $M_{\text{ADHD}} = 4.06$ ,  $M_{\text{control}} = 3.93$ ,  $t(89) = .499$ ,  $p = \text{n.s.}$

Next, participants with ADHD only and ADHD plus any current SCID-CV anxiety disorder were compared with regard to these protective factors. Participants with ADHD only tended to endorse more perceived social support than those with ADHD plus a current anxiety diagnosis,  $M_{\text{ADHD only}} = 5.24$ ,  $M_{\text{ADHD + anxiety}} = 3.75$ ,  $t(43) = 2.31$ ,  $p = .03$ ,  $d = 0.76$ . Those with ADHD only and ADHD plus an anxiety diagnosis did not differ on number of academic resources utilized,  $M_{\text{ADHD only}} = 1.59$ ,  $M_{\text{ADHD + anxiety}} = 1.17$ ,  $t(44) = 0.83$ ,  $p = \text{n.s.}$ , utilization of mental health resources,  $M_{\text{ADHD only}} = 1.24$ ,  $M_{\text{ADHD + anxiety}} = 1.50$ ,  $t(44) = -0.73$ ,  $p = \text{n.s.}$ , or perceived family support,  $M_{\text{ADHD only}} = 4.15$ ,  $M_{\text{ADHD + anxiety}} = 3.33$ ,  $t(43) = 1.89$ ,  $p = \text{n.s.}$

Finally, multiple regression analyses were conducted to examine the relationship between these protective factors and symptoms of anxiety after accounting for ADHD group status. The MCQ-30, OCI-R, and SES were selected for use in these analyses

because of the group differences identified in the previous analysis. First, MCQ-30 was regressed on ADHD status in step one and on the four protective factor variables in step two. The regression equation with ADHD status as the predictor was significant,  $R^2 = .08$ , adjusted  $R^2 = .07$ ,  $F(1, 87) = 7.96$ ,  $p = .006$ , indicating that the ADHD and control groups differed with regard to MCQ-30 score. However, the four protective factors did not account for a significant proportion of the variance after controlling for the effects of ADHD status,  $R^2 \text{ change} = .04$ ,  $F(4, 83) = 0.91$ ,  $p = \text{n.s.}$  Second, OCI-R was regressed on ADHD status in step one and on the four protective factor variables in step two. Similarly, the regression equation with ADHD status as the predictor was significant,  $R^2 = .06$ , adjusted  $R^2 = .05$ ,  $F(1, 87) = 5.13$ ,  $p = .03$ , which indicated that there were group differences on OCI-R score, but the four protective factors did not account for a significant proportion of the variance after controlling for the effects of ADHD status,  $R^2 \text{ change} = .08$ ,  $F(4, 83) = 1.85$ ,  $p = \text{n.s.}$  Third, SES was regressed on ADHD status in step one and on the four protective variables in step two. As with the other regression analyses, the regression equation containing ADHD status as the predictor was significant,  $R^2 = .21$ , adjusted  $R^2 = .20$ ,  $F(1, 87) = 23.61$ ,  $p < .001$ , which indicated that there were group differences in SES, but the four protective factors did not account for a significant proportion of the variance after controlling for the effects of ADHD status,  $R^2 \text{ change} = .05$ ,  $F(4, 83) = 1.27$ ,  $p = \text{n.s.}$

### **Post-hoc Analyses**

**Post-hoc Analysis 1: Do participants with ADHD plus an anxiety disorder endorse more impairment than participants with ADHD only and than control**

**participants?** It was hypothesized that participants with ADHD plus a current anxiety disorder would endorse more current impairment than participants with ADHD only or control participants. Total scores for current impairment on the IRS were used for the following analyses. An examination of the skew and kurtosis for the total score indicated that the variables were normally distributed, and Levene's test of equality of error variances was not significant,  $F(2, 89) = 1.31, p = \text{n.s.}$ , indicating that the error variances of the groups did not differ significantly. A one-way analysis of variance was conducted to evaluate the relation between group status (control group, ADHD only, ADHD and a current anxiety disorder) and self-reported current impairment. The ANOVA was significant,  $F(2, 89) = 22.43, p < .001$ , partial  $\eta^2 = 0.34$ , indicating that there were mean differences and that group status accounted for 34% of the variance in current impairment. Follow-up tests using the Tukey HSD test were conducted to evaluate differences among the means. The ADHD plus current anxiety disorder group reported greater current impairment than either the ADHD only or control group. In addition, the ADHD only group reported greater current impairment than the control group, as would be expected given that impairment in at least one major domain is required for a diagnosis of ADHD. The 95% confidence intervals for the pairwise differences, as well as the means and standard deviations for the three groups, are reported in Table 9.

**Post-hoc Analysis 2: Do students with ADHD who take stimulant medication experience fewer symptoms of anxiety than students who do not take stimulant medication?** Some past research has suggested that treatment with stimulant medication in childhood may be protective against anxiety and other disorders in young adulthood

(Biederman et al., 2009). To examine the potential relationship between use of ADHD medication and anxiety symptoms in this sample, *t*-tests were conducted to determine whether participants in the ADHD group who took medication for ADHD in childhood or currently differed on the primary anxiety outcome measures compared to participants with ADHD who were not taking medication. There were no significant group differences between those who did and did not take ADHD medication in childhood ( $t_{BAI}[44] = -1.16, p = n.s.; t_{LSAS}[44] = 0.46, p = n.s.; t_{MCQ-30}[44] = -0.95, p = n.s.; t_{OCI-R}[44] = -1.40, p = n.s.; t_{PSWQ}[44] = -1.07, p = n.s.; t_{SES}[44] = -1.02, p = n.s.$ ), nor were there significant group differences between those who did and did not take ADHD medication currently ( $t_{BAI}[44] = -1.11, p = n.s.; t_{LSAS}[44] = -0.79, p = n.s.; t_{MCQ-30}[44] = -1.04, p = n.s.; t_{OCI-R}[44] = -0.75, p = n.s.; t_{PSWQ}[44] = -1.67, p = n.s.; t_{SES}[44] = -1.74, p = n.s.$ ).

**Post-hoc Analysis 3: Are upper-class college students more likely to have a current anxiety disorder than first-year college students?** It was hypothesized that upper-class students (e.g., second-year students and above) would be more likely to meet criteria for a current anxiety disorder than first-year students. This hypothesis was based on theoretical considerations, as upper-class students have had more time to encounter stressors or experiences that may precipitate an anxiety disorder; past research has also suggested that first-year students with ADHD, dyslexia, or both are less likely to experience anxiety than upper-class students (Nelson & Gregg, 2012). However, in this sample, upper-class students were no more likely than first-year students to endorse criteria for a current anxiety disorder,  $\chi^2(1, N = 92) = 1.02, p = n.s.$ , Cramér's  $V = .11$ .

## CHAPTER IV

### DISCUSSION

Young adults with ADHD are attending college in increasing numbers, though little is known about this population and how college students with ADHD may differ from people with ADHD who do not attend college. While it is relatively well-established that children, teens, and adults with ADHD are at increased risk for anxiety (Barkley et al., 1996; Biederman et al., 1991; Biederman et al., 1993; Elia et al., 2008; Murphy et al., 2002; March et al., 2000), there has been little research on anxiety in college students with ADHD. What research does exist has been limited by the use of poorly defined ADHD groups, relatively weak examinations of anxiety (e.g., one subscale of a larger measure), failing to systematically assess anxiety in all participants, and assessing anxiety disorders or symptoms but not both. The present study addressed the limitations of past studies by using a well-defined ADHD group, assessing anxiety systematically across all participants, and assessing both anxiety disorders and symptoms. This study also assessed for symptoms of each of the major *DSM-IV-TR* anxiety disorders.

#### **Primary Analyses**

The findings supported the hypothesis that participants with ADHD would be more likely to report a lifetime history of an anxiety disorder (Hypothesis 1a). Over 40% of participants in the ADHD group endorsed a lifetime history of an anxiety disorder,

compared with 17% of the control group. The ADHD group was over two times more likely to endorse a SCID-CV lifetime history of an anxiety disorder than the control group, a difference that was significant and reflective of a small-to-medium effect size. GAD was the most common lifetime anxiety diagnosis in the ADHD group, followed by PTSD and GAD. The findings also supported the hypothesis that participants with ADHD would be more likely than participants without ADHD to enter college with a lifetime history of an anxiety disorder (Hypothesis 1b). Thirty-nine percent of participants in the ADHD group endorsed the onset of an anxiety disorder prior to entering college, while only seventeen percent of control participants endorsed the onset of an anxiety disorder prior to entering college. The chi-square analysis revealed a small-to-medium effect size and suggested that participants with ADHD were over two times more likely to report that they had experienced the onset of any anxiety disorder prior to entering college compared with participants who did not have ADHD.

The question of whether participants with ADHD would be more likely than participants without ADHD to develop an anxiety disorder for the first time in college (Hypothesis 1c) could not be assessed due to the low numbers of participants in either group who reported the onset of a new anxiety disorder in college. Only one participant in the ADHD group and two participants in the control group reported the onset of a new anxiety disorder after beginning college. The low number of participants who reported the onset of a new anxiety disorder was unexpected, given that college had been conceptualized as a time of great risk for the onset of anxiety disorders generally and in students with ADHD due to the introduction of new stressors.

The ADHD and control groups were equally likely to endorse SCID-CV criteria for a current anxiety disorder, and thus Hypothesis 2a was not supported. Rates of current anxiety disorders in either group were fairly high, with 26% of participants in the ADHD group and 17% of participants in the control group endorsing current criteria for any SCID-CV anxiety diagnosis. This finding may be compared to the results from the ongoing *Trajectories of ADHD in College* (TRAC) study of UNCG students, which is collecting longitudinal data on first-year students with and without ADHD. The frequency of current anxiety disorders in the ADHD group in this study (26%) is comparable to the frequency of anxiety disorders observed in the ADHD group in the TRAC study, where 29.1% of participants with ADHD met criteria for a current anxiety disorder (A. D. Anastopoulos, personal communication, November 29, 2013). However, the rate of current anxiety diagnoses in the control group in this study (17%) is much higher than the rate in the TRAC control group (4.6%). This difference may be attributable to methodological differences between the two studies; diagnoses in the TRAC study were made following a panel review of participants' SCID-CV interviews and related rating scales, while diagnoses in the present study were assigned only on the basis of the SCID-CV interview.

There was partial support for the hypothesis that participants with ADHD would report more severe current anxiety symptoms (Hypothesis 2b). The MANOVA examining group differences was significant, and this model accounted for approximately 32% of the variance in anxiety scores. Follow-up analyses revealed that the ADHD group reported significantly poorer self-efficacy, more maladaptive beliefs about worry, and

more obsessive-compulsive symptoms than the control group. There were large effects of group on self-efficacy, and moderate effects of group on maladaptive beliefs about worry and obsessive-compulsive symptoms. Expected group differences in physical symptoms of anxiety, social anxiety, and worry were not observed, though an examination of the means for these measures generally suggested that the ADHD group had higher scores than the control group. The MANCOVA in which symptoms of depression, as measured by BDI score, were covaried was significant and suggested the group differences in the anxiety variables were not fully accounted for by the association with depression. However, follow-up ANCOVAs revealed that group differences remained significant only with regard to self-efficacy, as measured by SES score, after controlling for the variance associated with BDI. Group differences in maladaptive beliefs about worry and obsessive-compulsive symptoms, as measured by the MCQ-30 and OCI-R, were no longer significant after controlling for the variance associated with BDI score. This finding highlights the importance of considering the role of depression in any future study of anxiety in college students with ADHD.

There are several possible explanations for why the hypotheses regarding group differences in current anxiety disorders and symptoms were not fully supported. One possibility for why expected differences were not observed on these three measures is that true differences exist between groups on these variables but that the effect sizes are smaller than could be detected in a sample of this size. The study was powered to detect medium-to-large effects in anxiety symptoms, so smaller effects may not have been detected in this sample. A second possible explanation for this finding is that college



students with ADHD who *remain* in college represent an even more resilient sub-population of the individuals with ADHD who *enter* college. That is, it is possible that the greater impairment associated with having both ADHD and anxiety disorder increases the risk for suspension or dropout among students with both disorders; students with ADHD who remain in college may therefore be a particularly high-functioning group in comparison to the group of all students with ADHD who enter college. The cross-sectional design of this study captured only individuals with ADHD who entered and were enrolled in college, which may explain why expected differences between groups were not found.

There was little support for the hypothesis that use of academic resources and supports, treatment for ADHD and/or other mental health concerns, support from friends, and support from family would be associated with fewer symptoms of anxiety (Hypothesis 3). Participants who had ADHD only endorsed greater current social support than participants who had both ADHD and an anxiety disorder. However, none of these hypothesized risk factors accounted for any variance in MCQ-30, OCI-IR, or SES scores after controlling for the variance associated with ADHD group status.

There are at least three possible explanations for why the predicted protective factors were not associated with anxiety in this sample. First, protective factors were assessed using the CLQ, which was developed for the purposes of this study because there is not a known measure that assesses the hypothesized protective factors in this population. The CLQ was not validated prior to inclusion in the study; the Cronbach's alpha for the CLQ in this sample was poor, though the measure does assess several

constructs that were not necessarily expected to hang together. However, it remains possible that the psychometric characteristics of the CLQ limited its usefulness in this study. Second, while the study sample was sufficient to detect medium-to-large effect sizes in the regression analysis, it is possible that the associations between these hypothesized protective factors and anxiety symptoms were too small to be detected in a sample of this size. Third, it is possible that these factors are not protective and that other potential protective factors should be explored.

### **Post-hoc Analyses**

Group differences in impairment were examined in a post-hoc analysis. Self-reported current impairment was significantly higher in participants with ADHD plus an anxiety disorder in comparison to participants with ADHD only or participants in the control group. This finding is consistent with research demonstrating that children with ADHD plus another disorder exhibit more impairment than children with ADHD only (Booster, DuPaul, Eiraldi, & Power, 2012; Crawford, Kaplan, & Dewey, 2006).

Participants with ADHD only also endorsed greater current impairment than control participants. This finding underscores the clinical importance of identifying and treating ADHD with co-occurring anxiety in college students.

The possible effects of stimulant medication use on anxiety in participants in the ADHD group were also examined in a post-hoc analysis. There were no differences in anxiety symptoms between those who were and were not currently taking medication for ADHD, nor were there differences in anxiety symptoms between those who did and did not take medication for ADHD in childhood. The possibility of examining differences

related to use of medication for ADHD arose post-hoc, and these analyses are limited by the fact that use of medication for ADHD currently and in childhood were assessed using only one question each (“Are you currently being treated with medication for ADHD or ADD?” [Participant Information Form] and “Prior to becoming a college student, did you receive any of the following services for ADHD? --Psychiatric medication” [College Life Questionnaire]). Medication-related variables that may have been important to examining a relationship between stimulant medication use and anxiety (such as frequency of use, duration of use, and stimulant vs. non-stimulant medication) were not assessed, and further study would be required to make stronger conclusions.

Finally, the possibility that upper-class students may be more likely to endorse criteria for a current anxiety disorder was assessed. The unexpected finding that first-year and upper-class students were equally likely to meet criteria for a current anxiety disorder may suggest that the college experience does not precipitate anxiety disorders as previously thought. The finding was also contrary to the results of another recent study (Nelson & Gregg, 2012), though the aforementioned study included a more heterogeneous group of students with ADHD, dyslexia, or both, which may partly account for the difference in findings. However, it should also be noted that the finding of the present study may also provide evidence that college students who remain enrolled in college represent a particularly resilient sub-population.

### **Limitations**

Although the results of this study are promising, they must be interpreted within the context of several limitations. The cross-sectional nature of the study is an important

limitation in at least two ways. First, the study captured students with ADHD who were enrolled in any year of college but did not capture students with ADHD who entered college but were not currently enrolled. As noted previously, the participants with ADHD in this study may have actually been a sample of an especially resilient sub-population of students with ADHD who enter college. A second drawback of the cross-sectional design is that anxiety symptoms could not be assessed in the same participants over time. While the SCID-CV is designed to retrospectively assess lifetime history of anxiety disorders, there are no known measures that allow for retrospective assessment of anxiety symptoms. Therefore, the possibility that participants with ADHD experienced an increase in anxiety disorders during the transition from high school to college could be assessed while the possibility that participants with ADHD experienced an increase in anxiety symptoms during that transition could not be assessed.

The difference in the settings from which participants for each group of the study were recruited is an additional limitation of this study. That is, participants for the ADHD group were recruited from an ADHD specialty clinic and represented a clinical sample, while the participants in the control group were recruited from a Psychology course and reported significantly less mental health treatment than participants in the ADHD group. Past research has shown that there are greater rates of psychiatric comorbidity in treatment settings compared with the general population (du Fort, Newman, & Bland, 1993). However, in this study greater comorbidity was not in fact observed in the ADHD group with regard to current anxiety diagnoses as would generally be predicted. Future research on this topic would ideally recruit participants from similar settings, though the

challenges of recruiting college students with ADHD from a setting other than a treatment setting are acknowledged.

Students in either group were permitted to receive mental health treatment for ADHD, anxiety, or any other condition. Unfortunately, the information gathered about participants' current utilization of mental health services asked about these services in a general way that did not establish whether participants had received any treatment for anxiety. It is possible, therefore, that students in either group were taking medication or participating in therapy that targeted their symptoms of anxiety. As noted previously, the ADHD group reported higher utilization of mental health services, and so another possible reason that some expected differences were not found was that the ADHD group had actually received treatment that directly addressed anxiety.

The sample for this study was drawn from only one four-year public university in the southeast, and nearly two-thirds of the sample was female. While the ratio of females to males in this sample was representative of the demographics of the undergraduate population of UNCG, adult males with ADHD still tend to outnumber adult females with the disorder and thus these results should be replicated in samples containing more males. Further, though there are not good data on this topic, it is likely that many students with ADHD actually attend two-year or community colleges, and it cannot be assumed that these results generalize to students attending two-year colleges. Students with ADHD who attend four-year colleges and universities, as in this sample, may again represent an especially resilient sub-population of individuals with ADHD who attend college.

A further limitation was the use of two different raters, who were not blinded to the study hypotheses and who did not undergo checks on inter-rater reliability, for the SCID-CV ratings. The biases of the non-blinded raters cannot be ruled out as a possible explanation for the differences that were found in lifetime history of SCID-CV diagnoses. Additionally, while both raters were trained similarly initially, the use of two raters may have introduced variability into the diagnoses that were assigned based on SCID-CV diagnoses. While practical limitations precluded the use of blinded raters who would undergo periodic checks on inter-rater reliability, such raters would have strengthened this study.

A final limitation of the study is the reliance on participant self-report of anxiety. While the clinical assessment of anxiety in adults typically relies on self-report interviews and questionnaires as in this study, other techniques, such as the dot-probe paradigm, have been used in research to detect anxiety-related information processing biases and may be less sensitive to socially-desirable responding or attempts to minimize symptoms (MacLeod, Mathews, & Tata, 1986). Performance on objective tasks that assess anxiety-related phenomena could have been a useful and interesting adjunct measure for this study.

### **Summary of Findings**

Taken together, the results of this study indicate that approximately 40% of college students with ADHD enter college with a lifetime history of an anxiety disorder and that students with ADHD are significantly more likely than other students to enter college with a history of an anxiety disorder. No known study has examined the lifetime

history of anxiety disorders in college students with ADHD, and this finding represents a new contribution to the literature. Around one quarter of college students with ADHD meet criteria for a current anxiety disorder, though their risk for a current anxiety disorder appears to be comparable to that of a general college population. Students with ADHD and a current anxiety disorder also report significantly more impairment than students with ADHD only or the general population of college students. These findings suggest that the rates of lifetime and current anxiety disorders among college students with ADHD may be much higher than previously reported in the only published study on the topic (Heiligenstein & Keeling, 1995).

College students with ADHD do also appear to experience poorer self-efficacy and greater maladaptive beliefs about worry and obsessive-compulsive symptoms (though the relation with maladaptive beliefs about worry and obsessive-compulsive symptoms can be accounted for by depression). That is, students with ADHD who are enrolled in college, who may represent an especially resilient sub-population of students with ADHD who enter college, still appear to experience poorer self-efficacy and greater symptoms of some types of anxiety, when compared to their peers that do not have ADHD. These findings are consistent with previous studies suggesting that, compared to their peers, college students with ADHD are at risk for poor self-esteem and symptoms of anxiety (Richards et al., 1999; Shaw-Zirt et al., 2005).

The biopsychosocial model that provided the conceptual basis for this study predicted that college entry as well as the stresses associated with college life may precipitate the onset of an anxiety disorder in a college student with ADHD. Some

findings, such as the finding that students with ADHD have poorer self-efficacy, more maladaptive beliefs about worry, and greater obsessive-compulsive symptoms compared to students without ADHD, may support this notion. Other findings, such as the finding that students with and without ADHD were equally likely to meet diagnostic criteria for a current anxiety disorder and the finding that first-year and upper-class students were equally likely to meet criteria for a current anxiety disorder, did not support this notion but may be related to the cross-sectional nature of the study. Longitudinal research will be needed to further examine the role of college entry and college-related stresses as a potential precipitant of anxiety in college students with ADHD.

### **Future Research**

As described previously, longitudinal research that examines anxiety in college students with ADHD during their transition to college and throughout their time in college will be a useful next step in this area. For instance, the aforementioned TRAC study is currently following a large sample of college students at three universities with and without ADHD to examine, among several other things, how students' anxiety symptoms and disorders unfold during college. One advantage of the design of this study is that students who leave college will continue to be followed over time. Thus, the TRAC study will be able to examine whether students with ADHD are more likely to experience anxiety, regardless of whether they stay in college. The large sample recruited for this study will also permit the detection of smaller effect sizes than was possible in this study. The TRAC study will also be able to examine the possible impact of treatment, including stimulant medication, on anxiety.



Future research on anxiety in college students with ADHD should continue to examine anxiety as a multi-faceted construct. For example, anxiety should continue to be examined both categorically (e.g., disorders) and dimensionally (e.g., symptoms); the results of this study suggest that college students with ADHD may be more likely to endorse symptoms of anxiety but may not be at greater risk for a current anxiety disorder. Further, various types of anxiety symptoms should be assessed; this study demonstrated that students with ADHD may differ from students without ADHD on certain types of anxiety but not others. The results of this study also suggest that symptoms of depression, not surprisingly, are related to symptoms of anxiety in college students, and measures of depression should be included in any future research on this topic.

Additional research is also needed on factors that contribute to having more or less anxiety in college students with ADHD. None of the factors that were hypothesized to be protective against anxiety were associated with anxiety in this sample, suggesting that other possible factors may need to be examined. For example, use of certain academic strategies, exercise, or even individual differences (such as stronger memory skills) may be protective against anxiety in this population but were not examined in this study. As identification of protective factors may provide useful information about factors that could be enhanced as part of treatment, it is worthwhile to consider continued study of protective factors in this population. Additional research should establish the validity and reliability of measures to assess protective factors in college students.

Finally, research on anxiety in college students with ADHD should continue to examine the potential impact of stimulant medication usage. In this study, there was no

association between current stimulant medication usage and current symptoms of anxiety; as noted previously, however, the questions about current stimulant use were likely not specific enough to draw many conclusions about the relation between stimulant medication use and symptoms of anxiety even if a significant relation had been found. Existing research in this area is quite limited. As noted previously, some longitudinal research found that children who took stimulant medication were less likely to experience anxiety several years later (Biederman et al., 2009). In contrast, a naturalistic study of first-year college students found there were no differences in symptoms of ADHD, academic concerns, depressive symptoms, or social satisfaction between students with ADHD who did and did not use stimulant medications (Rabiner et al., 2008). The authors of this study suggest that the difficulty of the transition to college may attenuate the potential benefits of the medications, or that the students who reported taking medication may not have taken the medication regularly enough to experience the benefits of it. Research in children has demonstrated that atomoxetine may help with comorbid symptoms of depression and anxiety, the effect of this medication on anxiety symptoms in adults has not been well studied (Prince, Wilens, Spencer, & Biederman, 2006). Trials of stimulants in college populations should consider the possible impact on symptoms of anxiety, and longitudinal research on college ADHD populations should consider how use of stimulant medications may impact anxiety symptoms over time.

### **Clinical Implications**

From a public health perspective, mental health services at colleges and universities are very important. Hunt and Eisenberg (2010) argue that:

college represents the only time in many people's lives when a single integrated setting encompasses their main activities – both career-related and social – as well as health services and other support services. Campuses, by their scholarly nature, are also well positioned to develop, evaluate, and disseminate best practices. In short, colleges offer a unique opportunity to address one of the most significant public health problems among late adolescents and young adults (p. 3).

Therefore, colleges and universities may be in a good position to help students in need and intervene at a critical point in their developmental trajectories. It is important for individuals working with college students, from mental health professionals to professors and providers of other campus services, to be knowledgeable about ADHD due to the increasing number of students with ADHD that are enrolling in college (Wolf, 2001). Knowledge about ADHD, including about the experiences of college students with ADHD as well as about the rights of individuals with ADHD, can inform mental health assessment and treatment of college students as well as academic services for students.

The results of the present study suggest that thorough assessment and comprehensive treatment planning for high school students with ADHD before they enter college would be prudent. For instance, a comprehensive ADHD evaluation during a high school student's junior or senior year may help to identify any co-occurring conditions, such as anxiety disorders, and to guide the student and his or her family to treatments that can address the student's needs. The evaluation may also help to educate the student about his or her ADHD and co-occurring conditions as well as about useful compensatory strategies that the student can begin to implement prior to entering college (such as use of a daily planner, to-do list, effective study strategies, etc.) in order to promote experiences of success.

With regard to assessment of college students with ADHD, the results of this study highlight the possibility that college students presenting for evaluation of difficulties suggestive of ADHD may also have an anxiety disorder and/or symptoms of anxiety. In this study, students with ADHD were most likely to meet diagnostic criteria for GAD, PTSD, and Social Phobia. It is imperative that ADHD evaluations also thoroughly assess for possible anxiety disorders as well as anxiety symptoms and self-efficacy concerns. The assessment of anxiety should be as comprehensive and thorough as the assessment of ADHD and should include interviews, self-report behavior rating scales, and possibly collateral information from others who know the student.

There is a dearth of research on effective treatments for college students with ADHD, and no expert or consensus guidelines exist for the treatment of ADHD in college students. Only one controlled study has examined the effects of stimulant medication in college students with ADHD. In a double-blind, placebo-controlled study Vyvanse was found to have significant and beneficial effects with regard to ADHD symptoms, executive functioning, and study and organizational skills but did not normalize functioning in these areas when compared to students without ADHD (DuPaul et al., 2012). In this trial, participants taking Vyvanse experienced a decrease in obsessive-compulsive symptoms but did not experience a decrease in other anxiety symptoms. Only one published study has examined a behavioral intervention for college students with ADHD. This study, an open trial, has examined the combination of a group-based cognitive-behavioral therapy and individual coaching for college students with ADHD, and the results are promising (Anastopoulos & King, 2014). Results from

this study suggest that participants experienced modest but non-significant decreases in anxiety over the course of participation in the intervention (K. A. King, personal communication, June 5, 2013). Results from case studies and qualitative studies of coaching for ADHD are also promising (Parker & Boutelle, 2009; Swartz, Prevatt, & Proctor, 2005), though the impact of coaching on anxiety in students with ADHD is unknown. No known studies have replicated these results, nor has any study examined the combination of medication and behavioral treatment for college students with ADHD.

Future research on all of these treatment modalities should acknowledge the possible comorbidity between ADHD and anxiety. Some evidence from research with children suggests that anxiety moderates the outcome of treatment for ADHD and that combined behavior therapy and stimulant medication treatment targeted at ADHD also has a beneficial effect on internalizing symptoms (The MTA Cooperative Group, 1999). The impact on anxiety of CBT for ADHD in adults is unknown; however, it is conceivable that some aspects of CBT for ADHD, such as cognitive restructuring and behavioral management of avoidance, may address anxiety as well as ADHD. If CBT for ADHD is not found to impact symptoms of anxiety, CBT that directly targets anxiety could be incorporated into treatment. In addition, the finding that social support may be protective against anxiety in college students with ADHD suggests that using therapy to encourage the development of social support may be useful. For example, delivering treatment in a group modality, which may promote a sense of social support as well as provide an opportunity for group members to develop friendships with similar others, may be useful.

## **Conclusion**

This study is one of the first to examine anxiety disorders and symptoms in a rigorously assessed group of college students with ADHD and a matched comparison group. As hypothesized, college students with ADHD were significantly more likely than comparison students to have a lifetime history of an anxiety disorder and were also more likely to have a lifetime history of an anxiety disorder at the time they entered college. These findings regarding the lifetime history of anxiety disorders in college students with ADHD had not been examined or documented in previous investigations of anxiety in college students with ADHD. Few students in either group reported the new onset of an anxiety disorder in college, which was unexpected. With regard to current anxiety, students with ADHD were equally likely to endorse criteria for a current anxiety disorder compared to students without ADHD. Students with ADHD were, however, more likely to endorse poorer self-esteem, more maladaptive beliefs about worry, and more severe obsessive-compulsive symptoms. This study also examined possible factors that may be associated with fewer symptoms of anxiety in students with ADHD, such as use of academic resources, mental health treatment, and support from family and friends; only perceived social support was associated with decreased risk for a current anxiety disorder in the ADHD group, and no hypothesized protective factor was associated with symptoms of anxiety. Post-hoc analyses revealed that students with both ADHD and an anxiety disorder also report more impairment than students with ADHD only or students in the control group. This study highlights the need to assess for and treat anxiety in

college students with ADHD. Longitudinal research is needed to further elucidate the relation between ADHD and anxiety in college students.

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# APPENDIX A

## TABLES AND FIGURES

*Table 1. Demographic Characteristics of ADHD and Control Groups*

	Total Sample (N = 92)	ADHD (n = 46)	Control (n = 46)
	<u>M (SD)</u>	<u>M (SD)</u>	<u>M (SD)</u>
Age	20.2 (1.8)	20.5 (2.0)	20.0 (1.5)
	<u>% (n)</u>	<u>% (n)</u>	<u>% (n)</u>
Gender			
Male	34 (31)	33 (15)	35 (16)
Female	66 (61)	67 (31)	65 (30)
Ethnicity			
Hispanic/Latino	12 (11)	15 (7)	9 (4)
Non-Hispanic/Latino	88 (81)	85 (39)	91 (42)
Race			
Caucasian/White	59 (54)	57 (26)	61 (28)
African American/Black	16 (15)	17 (8)	15 (7)
Asian-American	4 (4)	2 (1)	6 (3)
Multiracial	4 (4)	6 (3)	2 (1)
Other/Not Reported	16 (15)	17 (8)	16 (7)
Class Rank			
Freshman	40 (37)	30 (14)	50 (23)
Sophomore	25 (23)	22 (10)	28 (13)
Junior	15 (14)	24 (11)	7 (3)
Senior	20 (18)	24 (11)	15 (7)

*Note:* The ADHD and control groups did not differ significantly on age, gender, ethnicity, race, or class rank.

*Table 2. Other Background Characteristics of ADHD and Control Groups*

	Total Sample (N = 92)	ADHD (n = 46)	Control (n = 46)
Grade Point Average	<u><i>M (SD)</i></u> 2.8 (0.67)	<u><i>M (SD)</i></u> 2.6 (0.68)	<u><i>M (SD)</i></u> 3.1 (0.55)
Extracurricular	<u>% (n)</u>	<u>% (n)</u>	<u>% (n)</u>
Member of Greek organization	9 (8)	11 (5)	7 (3)
Member of college athletic team	3 (3)	4 (2)	2 (1)
Current Living Situation			
On campus in a dorm	40 (37)	39 (18)	41 (19)
Off campus within a 10 minute drive	30 (28)	35 (16)	26 (12)
Off campus more than a 10 minute drive	9 (8)	11 (5)	7 (3)
At home with parent(s)	21 (19)	15 (7)	26 (12)



Table 3. Psychological Characteristics of ADHD and Control Samples

	ADHD (n = 42)	Control (n = 42)
	<u>M (SD)</u>	<u>M (SD)</u>
ADHD-RS Self-Report		
IA Symptom Count – Childhood	7.4 (2.1)	1.7 (2.2)
HI Symptom Count – Childhood	6.5 (2.2)	2.3 (1.9)
IA Symptom Count – Current	7.0 (1.9)	0.61 (0.93)
HI Symptom Count – Current	4.7 (2.3)	1.0 (1.0)
ADHD Interview		
IA Total Symptom Count	7.6 (1.4)	---
HI Total Symptom Count	4.7 (2.4)	---
CAARS-S:L ( <i>t</i> -scores)		
Inattention/Memory Problems	74.2 (9.5)	---
Hyperactivity/Restlessness	63.7 (9.9)	---
Impulsivity/Emotional Lability	62.4 (11.7)	---
Problems with Self-Concept	64.0 (10.9)	---
DSM-IV IA Symptoms	85.4 (10.5)	---
DSM-IV HI Symptoms	65.1 (13.8)	---
DSM-IV Total ADHD Symptoms	78.6 (11.5)	---
ADHD Index	69.3 (7.5)	---
	<u>% (n)</u>	<u>% (n)</u>
ADHD Subtype		
Predominantly Inattentive Type	50 (23)	---
Combined Type	44 (20)	---
Not Otherwise Specified	6 (3)	---
Mental Health		
Current ADHD medication	44 (20)	---
Current anxiety disorder diagnosis (by self-report)	33 (15)	9 (4)

*Note.* ADHD-RS = ADHD-Rating Scale Adult Version; HI = Hyperactive-Impulsive; IA = Inattentive; CAARS = Conners' Adult ADHD Rating Scale – Self Report: Long Version.

Table 4. Study Measures

	ADHD Group	Control Group
Measures Used to Determine Study Eligibility	<ul style="list-style-type: none"> <li>• ADHD-RS<sup>a</sup></li> <li>• CAARS-S:L<sup>a</sup></li> <li>• Infrequency Scale</li> <li>• SCID-CV<sup>a</sup></li> <li>• Semi-Structured ADHD Interview<sup>a</sup></li> </ul>	<ul style="list-style-type: none"> <li>• ADHD-RS<sup>b</sup></li> <li>• Infrequency Scale<sup>b</sup></li> </ul>
Measures Completed for this Study	<ul style="list-style-type: none"> <li>• AUDIT</li> <li>• BAI<sup>a</sup></li> <li>• BDI</li> <li>• College Life Questionnaire</li> <li>• Impairment Rating Scales</li> <li>• LSAS-SR</li> <li>• MCQ-30</li> <li>• OCI-R</li> <li>• Participant Information Form</li> <li>• PSWQ</li> <li>• SES</li> <li>• SCID-CV<sup>a</sup></li> </ul>	<ul style="list-style-type: none"> <li>• AUDIT</li> <li>• BAI</li> <li>• BDI<sup>b</sup></li> <li>• College Life Questionnaire</li> <li>• Impairment Rating Scales</li> <li>• LSAS</li> <li>• MCQ-30</li> <li>• OCI-R</li> <li>• Participant Information Form</li> <li>• PSWQ</li> <li>• SES</li> <li>• SCID-CV</li> </ul>

*Note.* ADHD-RS = Attention-Deficit/Hyperactivity Disorder Rating Scale; AUDIT = Alcohol Use Disorders Identification Test; BAI = Beck Anxiety Inventory; BDI = Beck Depression Inventory; CAARS-S:L = Conners' Adult ADHD Rating Scale – Self Report: Long Version; LSAS – SR = Liebowitz Social Anxiety Scale – Self-Report; MCQ-30 = Meta-Cognitive Questionnaire – 30; OCI-R = Obsessive-Compulsive Inventory-Revised; PSWQ = Penn State Worry Questionnaire; SCID-CV = Structured Clinical Interview for Axis I Disorders, Clinician Version; SES = Self-Efficacy Scale.

<sup>a</sup> These measures were typically completed as part of a clinical or research evaluation at the ADHD Clinic; when applicable, participants in the ADHD group provided written permission for the researcher to access this information so that these measures did not have to be repeated during study participation.

<sup>b</sup> These measures were completed during mass screening and were not repeated.

*Table 5. Descriptive Statistics for Outcome Variables for Total Sample (N = 92)*

	<i>M</i>	<i>SD</i>	Min	Max	Skew	Kurtosis
AUDIT	1.08	0.84	0	2.94	0.13	-0.99
BAI	2.13	0.89	0	3.87	-0.10	-0.60
BDI	1.73	1.08	0	3.66	-0.34	-1.01
LSAS-SR	35.29	23.77	1	107	0.76	0.21
MCQ-30	27.68	16.33	2	79	0.86	0.38
OCI-R	2.22	0.97	0	4.20	-0.57	0.07
PSWQ	45.70	15.29	21	77	0.33	-1.01
SES	76.26	12.62	48	104	-0.57	-0.43

*Note.* AUDIT = Alcohol Use Disorders Identification Test (log-transformed); BAI = Beck Anxiety Inventory (log-transformed); BDI = Beck Depression Inventory (log-transformed); LSAS-SR = Liebowitz Social Anxiety Scale – Self Report; MCQ-30 = Meta-Cognitive Questionnaire – 30; OCI-R = Obsessive-Compulsive Inventory – Revised (log-transformed); PSWQ = Penn State Worry Questionnaire; SES = Self-Efficacy Scale.

Table 6. Correlations Among MANOVA Variables for Final Sample (N = 92)

Variable	1	2	3	4	5	6	7	8
1 AUDIT	--							
2 BAI	.06	--						
3 BDI	.12	.59**	--					
4 LSAS-SR	.09	.50**	.44**	--				
5 MCQ-30	.10	.67**	.58**	.57**	--			
6 PSWQ	.03	.68**	.52**	.57**	.72**	--		
7 OCI-R	.05	.49**	.52**	.50**	.64**	.56**	--	
8 SES	-.07	-.18	-.37**	-.44**	-.33**	-.21*	-.13	--

*Note.* AUDIT = Alcohol Use Disorders Inventory Test (log-transformed); BAI = Beck Anxiety Inventory (log-transformed); BDI = Beck Depression Inventory (log-transformed); LSAS-SR = Liebowitz Social Anxiety Scale – Self Report; MCQ-30 = Meta-Cognitive Questionnaire – 30; OCI-R = Obsessive-Compulsive Inventory – Revised (log-transformed); PSWQ = Penn State Worry Questionnaire; SES = Self-Efficacy Scale.

\*  $p < .05$

\*\*  $p < .01$

Table 7. Lifetime and Current SCID-CV Anxiety Diagnoses by Group

	ADHD (n = 46)	Control (n = 46)	$\chi^2$ (1 df)
	<u>% (n)</u>	<u>% (n)</u>	
Any Lifetime Anxiety Diagnosis	41 (19)	17 (8)	6.34*
Agoraphobia	4 (2)	0 (0)	
Generalized Anxiety Disorder	22 (10)	9 (4)	
Obsessive-Compulsive Disorder	7 (3)	7 (3)	
Panic Disorder	4 (2)	4 (2)	
Post-Traumatic Stress Disorder	15 (7)	2 (1)	
Social Phobia	9 (4)	11 (5)	
Specific Phobia	0 (0)	2 (1)	
Any Current Anxiety Diagnosis	26 (12)	17 (8)	1.02
Agoraphobia	0 (0)	0 (0)	
Generalized Anxiety Disorder	15 (7)	9 (4)	
Obsessive-Compulsive Disorder	4 (2)	7 (3)	
Panic Disorder	0 (0)	2 (1)	
Post-Traumatic Stress Disorder	6 (3)	2 (1)	
Social Phobia	9 (4)	9 (4)	
Specific Phobia	0 (0)	2 (1)	

*Note.* The numbers of participants meeting criteria for individual anxiety diagnoses sum to greater than the number of participants endorsing any diagnosis, as several participants met diagnostic criteria for more than one anxiety disorder.

\*  $p < .05$

*Table 8. Results of Follow-up ANOVAs Comparing ADHD and Control Groups on Measures of Anxiety Symptoms.*

Variable	<i>Df</i>	<i>F</i>	<i>p</i>	Partial $\eta^2$	Group	<i>M</i>	<i>SD</i>
BAI	1	0.803	.37	0.01	ADHD	2.21	.88
					Control	2.04	.91
LSAS	1	0.642	.42	0.01	ADHD	37.28	23.8
					Control	33.30	23.8
MCQ-30	1	6.55 <sup>a</sup>	.01*	0.07	ADHD	31.91	13.5
					Control	23.46	17.9
OCI-R	1	4.61	.03*	0.05	ADHD	2.43	.98
					Control	2.00	.91
PSWQ	1	0.81	.37	0.01	ADHD	47.13	14.1
					Control	44.26	16.4
SES	1	25.43	<.001*	0.22	ADHD	70.37	12.5
					Control	82.15	9.7

*Note.* BAI = Beck Anxiety Inventory (log transformation); LSAS-SR = Liebowitz Social Anxiety Scale – Self-Report; MCQ-30 = Meta-Cognitive Questionnaire – 30; OCI-R = Obsessive-Compulsive Inventory-Revised (log transformation); PSWQ = Penn State Worry Questionnaire; SES = Self-Efficacy Scale.

\* $p < .05$

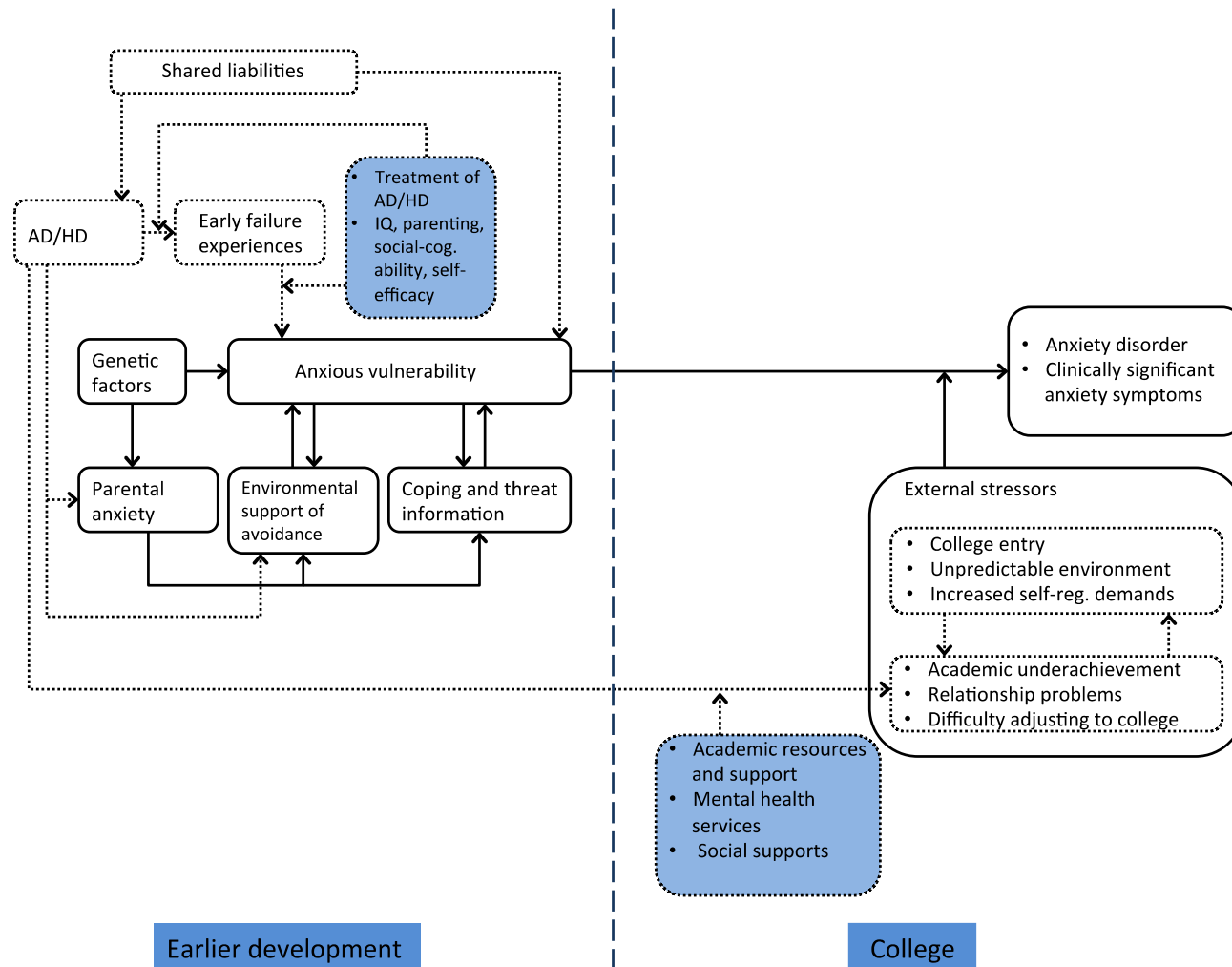
<sup>a</sup>The assumption of equality of population variances are the same was violated for the MCQ-30 variable, suggesting that that overall *F* statistic may be unreliable. The Welch's *t* statistic, which does not assume equality of population variances, was calculated ( $t[1, 83.587] = 6.55, p = .01$ ) and was also significant.

*Table 9. 95% Confidence Intervals of Pairwise Differences in Current Impairment*

Group	<i>M</i>	<i>SD</i>	ADHD + Anxiety	ADHD Only
ADHD + Anxiety	17.50	5.76		
ADHD Only	10.82	5.64	[2.54, 10.82*]	
Control	6.65	4.63	[6.85, 14.84*]	[1.38, 6.96*]

*Note.* An asterisk indicates that the difference in means is significant at the  $p < .05$  level using Tukey's HSD test.

Figure 1. Biopsychosocial Model of the Development of Anxiety in College Students with ADHD





## APPENDIX B

### COLLEGE LIFE QUESTIONNAIRE

**1. Since becoming a college student (at UNCG or elsewhere), how often have you used these academic services:**

	<i>Never/ Rarely</i>	<i>Sometimes</i>	<i>Often</i>	<i>Very Often</i>
Learning Assistance Center (includes Special Support Services program; Supplemental Instruction Program (SIP); Student Study Program; Student Success Center for tutoring or academic skills help)	0	1	2	3
Students First Office	0	1	2	3
Student Academic Services (for academic probation)	0	1	2	3
Foundations for Learning course	0	1	2	3
Writing Center	0	1	2	3
Speaking Center	0	1	2	3
Office of Disability Services	0	1	2	3
Living & Learning Community	0	1	2	3
Tutoring through an academic department	0	1	2	3
Hired tutoring	0	1	2	3
Other (please list): _____	0	1	2	3

**2. Since becoming a college student (at UNCG or elsewhere), how often have you used psychological supports:**

	<i>Never/ Rarely</i>	<i>Sometimes</i>	<i>Often</i>	<i>Very Often</i>
Counseling/therapy	0	1	2	3
Group therapy	0	1	2	3
Psychiatrist or physician for medication	0	1	2	3

**3. Since becoming a college student (at UNCG or elsewhere), have you received a psychological evaluation (e.g., to assess for psychiatric diagnosis)?**

*Yes                      No*

**4. Since becoming a college student (at UNCG or elsewhere), how often...**

	<i>Never/Rarely</i>	<i>Sometimes</i>	<i>Often</i>	<i>Very Often</i>
...Have you received emotional support from your <u>friends</u> when you wanted to?	0	1	2	3
...Have your <u>friends</u> helped you when you needed it (e.g., giving you a ride, loaning you \$5, sharing class notes, etc.)?	0	1	2	3

**5. How many close friends do you have? \_\_\_\_\_**

**6. Overall, how satisfied are you with your current social life?**

*Not At All Satisfied                      Somewhat Satisfied                      Very Satisfied*

**7. Since becoming a college student (at UNCG or elsewhere), how often...**

	<i>Never/Rarely</i>	<i>Sometimes</i>	<i>Often</i>	<i>Very Often</i>
...Have you received emotional support from a <u>family member</u> when you wanted to?	0	1	2	3
...Has a <u>family member</u> helped you when you needed it (e.g., giving you a ride, loaning you \$5, sharing class notes, etc.)?	0	1	2	3
...Do you have contact with a member of your immediate family?	0	1	2	3

**8. Overall, how satisfied are you with your relationships with family members?**

*Not At All Satisfied                      Somewhat Satisfied                      Very Satisfied*

- 9. Prior to becoming a college student (i.e., in elementary, middle, and/or high school), how often did your parents help you with schoolwork (e.g., studying, completing homework, and so forth)?**

*Never/rarely                      Sometimes                      Often                      Very Often*

- 10. Prior to becoming a college student (i.e., in elementary, middle, and/or high school), how often did you use each of these academic accommodations:**

	<i>Never/Rarely</i>	<i>Sometimes</i>	<i>Often</i>	<i>Very Often</i>
Extra time on tests or assignments	0	1	2	3
Testing in a separate room	0	1	2	3
Tutoring	0	1	2	3
Modified assignments	0	1	2	3
1-on-1 Classroom aide	0	1	2	3
Other (please list): _____	0	1	2	3

- 11. Prior to becoming a college student (i.e., in elementary, middle, and/or high school), did you receive any of the following services for AD/HD?**

Individual therapy	<i>Yes</i>	<i>No</i>
Family therapy	<i>Yes</i>	<i>No</i>
Group therapy	<i>Yes</i>	<i>No</i>
Psychiatric medication	<i>Yes</i>	<i>No</i>

(Please indicate:  
\_\_\_\_\_)

- 12. Prior to becoming a college student (i.e., in elementary, middle, and/or high school), did you receive any services for a psychological problem OTHER than AD/HD (e.g., depression, anxiety, or other):**

Individual therapy	<i>Yes</i>	<i>No</i>
Family therapy	<i>Yes</i>	<i>No</i>
Group therapy	<i>Yes</i>	<i>No</i>
Psychiatric medication	<i>Yes</i>	<i>No</i>

(Please indicate:  
\_\_\_\_\_)

## APPENDIX C

### PARTICIPANT INFORMATION FORM

**Today's Date:** \_\_\_\_/\_\_\_\_/\_\_\_\_

**What is your gender?** ☐ Male ☐ Female ☐ Other

**What is your age in years?** \_\_\_\_\_

**How do you identify yourself? (Please check only one)**

- ☐ Asian-American
- ☐ African-American/Black
- ☐ Caucasian/White
- ☐ Latino-American/Hispanic
- ☐ Multiracial
- ☐ Native American
- ☐ Other

**Based on completed credit hours, what is your class standing? (Please check only one)**

- ☐ Freshman
- ☐ Sophomore
- ☐ Junior
- ☐ Senior

**At this time, what is your overall cumulative grade-point average (GPA)? For example, if your overall GPA is 2.3, you could circle "2" in the first row and "3" in the second row.**

0	1	2	3	4					
0	1	2	3	4	5	6	7	8	9

☐ I don't have a GPA yet

**Which situation best describes your current living quarters? (Please check only one)**

- ☐ On campus in a residence hall/dorm
- ☐ Off campus apartment or rented house within a 10-minute drive from campus
- ☐ Off campus apartment or rented house more than a 10-minute drive from campus
- ☐ At home with parent(s)
- ☐ Fraternity or sorority house
- ☐ I own my own home

**Are you a member of a fraternity or sorority at UNCG?** ☐ Yes ☐ No

**Are you a member of an athletic team at UNCG?** ☐ Yes ☐ No

**Have you ever been diagnosed with Attention-Deficit/Hyperactivity Disorder (AD/HD or ADD)?**

☐ Yes ☐ No

**If yes, were you diagnosed with Attention-Deficit/Hyperactivity Disorder (AD/HD or ADD ) while in college? ☐ Yes ☐ No**

**Are you currently being treated with medication for AD/HD or ADD? ☐ Yes ☐ No**

**Do you currently have a mood disorder diagnosis (e.g., Depression, Bipolar Disorder)? ☐ Yes ☐ No**

**Do you currently have an anxiety disorder diagnosis (e.g., Panic Disorder, Generalized Anxiety Disorder, Obsessive-Compulsive Disorder, Social Phobia)? ☐ Yes ☐ No**

**What is your father's occupation? \_\_\_\_\_**

**What is your mother's occupation? \_\_\_\_\_**

## APPENDIX D

### UNIVERSITY OF NORTH CAROLINA AT GREENSBORO CONSENT TO ACT AS A HUMAN PARTICIPANT: LONG FORM

Project Title: Anxiety In College Students with AD/HD

Project Director: Sarah O'Rourke, M.A.

Participant's Name: \_\_\_\_\_

#### **What is the study about?**

This is a research project. The aim of this project is to determine whether AD/HD (Attention-Deficit/Hyperactivity Disorder) is related to anxiety in college students.

#### **Why are you asking me?**

You are being asked to participate because you are an undergraduate student at UNCG. You can participate even if you do not have AD/HD or anxiety. Some students are being asked to participate because they have a diagnosis of AD/HD. Other students are being asked to participate because they do not have AD/HD. Only students at UNCG and only students who are between 18 and 30 years old are being asked to participate.

#### **What will you ask me to do if I agree to be in the study?**

If you agree to be in the study, you will be asked to complete questionnaires about symptoms of anxiety and depression, use of alcohol, and past treatment. You will also complete an interview about your anxiety. These questionnaires and interview should take approximately one to one-and-a-half hours to complete. You will complete the study either at the AD/HD Clinic at UNCG or in a room reserved for the purposes of the study. If you have questions about this study, you may contact Sarah O'Rourke, Project Director, at (336) 346-3192 x. 704.

#### **Is there any audio/video recording?**

No audio or video data is collected as part of this research project.

#### **What are the dangers to me?**

The Institutional Review Board at the University of North Carolina at Greensboro has determined that participation in this study poses minimal risk to participants. Some of the questionnaires ask about personal information, such as symptoms of anxiety and depression, alcohol use, and past treatment you may have received. These questions may cause you to feel uncomfortable. You may skip any questions that make you feel uncomfortable, and you may call or speak to project staff to have your questions answered. Participation is completely voluntary. You may withdraw from the project at any time without penalty.

If you have any concerns about your rights, how you are being treated or if you have questions, want more information or have suggestions, please contact Eric Allen in the Office of Research Compliance at UNCG toll-free at (855)-251-2351. Questions, concerns or complaints about this project or benefits or risks associated with being in this study can be answered by calling project staff who may be contacted at (336) 346-3192 to reach the project director, Sarah O'Rourke (ext. 704) or the principal investigator, Arthur D. Anastopoulos, Ph.D. (ext. 303).

**Are there any benefits to society as a result of me taking part in this research?**

This project may help us to better understand whether having AD/HD puts college students at risk for anxiety. This information may be used in the future to help us better assess and treat college students with AD/HD.

**Are there any benefits to *me* for taking part in this research study?**

There are no direct benefits to participants in this study.

**Will I get paid for being in the study? Will it cost me anything?**

If you learned about this study through your involvement with the AD/HD Clinic or through an advertisement, you will receive a gift card (\$15) after completing the study. If you signed up for the study through an introductory psychology class, you will receive research credit or extra credit for the class after completing the study. You can receive either class credit or a gift card, but you cannot receive both. If you complete interviews in order to determine whether you have AD/HD, you will receive an additional \$10 gift card.

**How will you keep my information confidential?**

All information obtained in this study is strictly confidential unless disclosure is required by law. The researcher may be required to break confidentiality if your answers tell us that you are at risk for harming yourself or someone else, or if you disclose unreported child abuse or disabled adult abuse. Names will not be on any of the questionnaires. Each participant will be assigned a special identification number before being given their questionnaires and interview. Your name will not be on any of the questionnaires or interview that you complete for this project. The only people who will see information about you are the researchers involved in this project. Your name will not be used in any reports from this study. The forms that you complete will be stored in locked file cabinets. Passwords will protect information that has been entered on a computer. All other information will be destroyed three years after the conclusion of this project.

If you are a participant in another research study at the AD/HD Clinic, such as *Depression in College Students with AD/HD*, the information that you provide for this study may be shared with that research team so that you do not have to complete the same questionnaires more than one time.

**What if I want to leave the study?**

You have the right to refuse to participate or to withdraw at any time, without penalty. If you do withdraw, it will not affect you in any way. If you choose to withdraw, you may request that any of your data which has been collected be destroyed unless it is in a de-identifiable state.

**What about new information/changes in the study?**

If significant new information relating to the study becomes available which may relate to your willingness to continue to participate, this information will be provided to you.

**Voluntary Consent by Participant:**

By signing this consent form you are agreeing that you read, or it has been read to you, and you fully understand the contents of this document and are openly willing consent to take part in this study. All of your questions concerning this study have been answered. By signing this form, you are agreeing that you are 18 years of age or older and are agreeing to participate in this study described to you by Sarah O'Rourke or another member of the research team.

---

**Signature**

---

**Date**

## APPENDIX E

### AUTHORIZATION TO DISCLOSE PHI

Sarah O'Rourke, M.A. and Arthur Anastopoulos, Ph.D. from the University of North Carolina at Greensboro are conducting a research study on anxiety in college students with AD/HD. They have requested permission to contact college students who have recently completed a diagnostic evaluation at the AD/HD Clinic at UNCG, to see if students are willing to participate in the study.

By signing below, you are authorizing the AD/HD Clinic at UNCG to release your name, phone number, diagnoses, and questionnaire and interview results from your recently completed AD/HD evaluation to Sarah O'Rourke. This authorization will expire in 1 year, unless you revoke it in writing before that date. If you wish to revoke the authorization, contact Sarah O'Rourke at (336) 346-3196 x. 704. A revocation will not apply to any personal health information that was released under this authorization before the date of revocation.

If you choose NOT to authorize release of this information, it will not affect your health care at the AD/HD Clinic. The AD/HD Clinic will not receive money or other benefit from releasing this information on you. You have a right to inspect or copy the information to be disclosed. You have a right to a copy of this authorization.

If you allow release of this information to Sarah O'Rourke, the information will no longer be subject to the Health Information Portability and Accountability Act (HIPAA). Sarah O'Rourke may disclose it without contacting you again for further authorization.

I authorize the AD/HD Clinic at UNCG to release the following information to Sarah O'Rourke:

- Name
- Telephone number
- My diagnoses
- Questionnaire and diagnostic interview results from my recently completed AD/HD evaluation

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

Printed Name: \_\_\_\_\_



APPENDIX F  
RECRUITMENT FLYER

**UNCG UNDERGRADUATE STUDENTS  
NEEDED FOR A RESEARCH STUDY**

- **Who can participate?**  
We are looking for UNCG college students who are ages 18 or older to participate in a research project looking at anxiety among college students with and without AD/HD. ***No diagnosis necessary.***
- **How much time will it take?**  
It will take approximately one to one-and-a-half hours to complete the study.
- **Where does the research take place?**  
College students will complete the study at the AD/HD Clinic at UNCG (3<sup>rd</sup> floor of the 1100 W. Market Street Building - located across from the SECU on the corner of Tate and Market Street)
- **Is there compensation for participation?**  
Students who complete the questionnaires will receive a \$15 Target gift card for participating.

**For more information...**

If you are interested, please call the project director  
**Sarah O'Rourke** at **336-346-3192 x704**  
or email **srourk@uncg.edu**

**Faculty Sponsor:**

Arthur D. Anastopoulos, PhD  
AD/HD Clinic at UNCG  
1100 W. Market Street  
3<sup>rd</sup> floor  
336-346-3196 x303